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PHYCOLOGIA BRITANNICA:

OR

A HISTORY OF BRITISH SEA-WEEDS,

CONTAINING

COLOURED FIGURES, GENERIC AND SPECIFIC CHARACTERS,
SYNONYMES, AND DESCRIPTIONS

OF

ALL THE SPECIES OF ALGÆ INHABITING THE SHORES OF THE

BRITISH ISLANDS.

BY

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IN FOUR VOLUMES.

VOL. IV.

CHLOROSPERMEÆ, OR GREEN SEA-WEEDS.

SYNOPSIS, No. 280 to 388.

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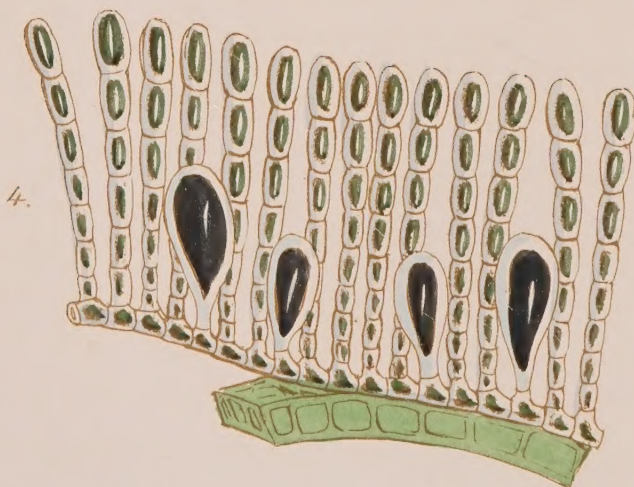
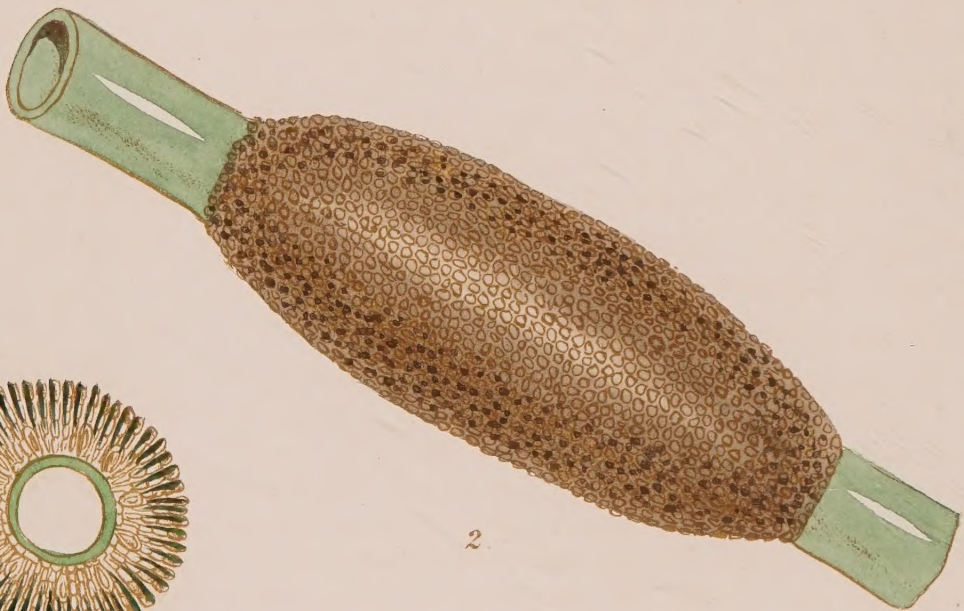


PLATE CCLXXX.

MYRIONEMA STRANGULANS, Grev.

GEN. CHAR. Minute *parasites*, consisting of a mass of short, erect, simple, jointed filaments, which spring from a thin expansion formed of decumbent, cohering filaments, spreading in patches on the surface of other Algæ. *Spores* oblong, affixed either to the erect, or to the decumbent filaments. MYRIONEMA (Grev.),—from *μυριος*, *numberless*, and *νημα*, a *thread*.

MYRIONEMA *strangulans*; patches convex, confluent, brown; the vertical filaments clavate, densely set; spores obovate, on short stalks, attached to the decumbent filaments.

MYRIONEMA *strangulans*, Grev. *Crypt. Fl.* t. 300. *Harv. in Hook. Br. Fl.* vol. ii. p. 391. *Harv. in Mack. Fl. Hib.* part 3. p. 223. *Harv. Man.* ed. 2. p. 51. *J. Ag. in Gen. and Sp. Alg.* vol. i. p. 48. *Kütz. Sp. Alg.* p. 540.

HAB. Parasitical on the fronds of various *Ulvæ* and *Enteromorphæ*. Annual. Summer and autumn. Common.

GEOGR. DISTR. Probably widely dispersed.

DESCR. The parasite first appears in the form of a dark brown stain, spotting the *Ulva* on which it grows, and at this stage consists of little more than an imperfect membrane composed of prostrate filaments. As it advances in growth the erect filaments are developed: the spots become convex, and gelatinous, and the plant is matured. It then, when growing on the cylindrical fronds of an *Enteromorpha*, completely invests the stem, forming a collar round it. Under the microscope, looking vertically on the parasite, the whole appears like a soft cushion, composed of innumerable brown dots set in a gelatinous matrix. These dots are the tips of the erect filaments, and the proper structure may be seen either by making a thin transverse slice, or by bruising the frond between two flat pieces of glass. The little plant will then be resolved into its component parts. *Spores* of large size, obovate, pedicellate, rising from the prostrate filaments, generally abundant. Articulations of the erect filaments about once and a half as long as broad, contracted at the joints, containing an olive endochrome.

In our first volume are figured (Plate XLI.) two species of *Myrionema*, a genus founded by Dr. Greville for the reception of the curious and beautiful little parasite here represented. *M. strangulans* abounds on all our coasts, and will always afford the possessor of a microscope an interesting subject for examination. The dark brown specks on the fronds of *Enteromorpha*

and *Ulvæ*, which look like incipient decay, are very often caused by the growth of our parasite, and their colour will direct the most unexamining eye to them. I have generally found the plant in a perfect state in summer and autumn, but specimens may be found at most seasons.

Fig. 1. Part of a frond of *Enteromorpha*, infested with MYRIONEMA STRANGULANS :—*the natural size*. 2. A frond of the *Myrionema*, seen vertically. 3. Transverse section of the same. 4. Filaments and spores :—*all more or less highly magnified*.



PLATE CCLXXXI.

GRIFFITHSIA BARBATA, *Ag.*

GEN. CHAR. *Frond* rose-red, filamentous; *filaments* jointed throughout, mostly dichotomous; ramuli single-tubed; dissepiments hyaline. *Fructification* of two kinds, on distinct individuals: 1, *tetraspores* affixed to whorled involucral ramuli: 2, gelatinous *receptacles* (*favellæ*), surrounded by an involucre, and containing a mass of minute angular spores. GRIFFITHSIA—so named by Agardh, in honour of Mrs. Griffiths of Torquay, the most distinguished of British Algologists.

GRIFFITHSIA *barbata*; filaments dichotomous, slender; articulations slightly pyriform, from five to eight times longer than broad, those near the apices of the branches emitting opposite or whorled, byssoid, dichotomous fibres (or ramuli) to which the tetraspores are attached; favellæ stalked.

GRIFFITHSIA *barbata*, *Ag. Syst.* p. 145. *Ag. Sp. Alg.* vol. ii. p. 132. *Harv. in Hook. Br. Fl.* vol. ii. p. 338. *Harv. Man.* ed. 1. p. 102. *Kütz. Sp.* p. 660.

CONFERVA *barbata*, *E. Bot.* t. 1814.

HAB. Parasitical on the smaller Algæ, in tide-pools. Annual. Summer. Very rare, and seemingly confined to the coasts of the British Channel. Beach at Brighton, *Mr. Borrer*. Jersey, *Miss Turner*.

GEOGR. DISTR. North coast of France; not uncommon in old oyster-beds, attached to the shells and to small stones, *Lenormand*.

DESCR. *Fronde* one to three inches high, as thick as hog's bristle below, capillary and byssoid above, forming dense, fastigate tufts, repeatedly and pretty regularly dichotomous; the lower axils rather distant and patent, the upper close together and very acute. All the lower part of the frond is bare of ramuli; but the articulations of the terminal ramuli give off throughout from their apices, opposite, or whorled, very slender, byssoid, dichotomous, spreading ramelli. *Articulations* from five to eight times as long as broad, slightly swollen upwards, or nearly cylindrical. *Favellæ* pedunculate, formed out of truncate branches, binate, surrounded by numerous, simple or forked, involucral ramuli. *Tetraspores* spherical, attached to the byssoid fibres that issue from the upper articulations, one tetraspore generally on each dichotomous fibre. *Colour* a fine, clear rose-red, changing to orange in fresh water. *Substance* tender and lubricous, most closely adhering to paper in drying.

I am indebted to Miss Turner, of Jersey, for beautiful specimens of this exceedingly rare plant, with both kinds of fructification—from some of which specimens the figure here offered

has been prepared. It is only necessary to glance at that figure, and compare it with the other species of *Griffithsia* figured in previous plates of this work, to see the strong characters by which the present is known from all the others. Here the few last articulations of all the branches are furnished with slender, byssoid fibres, and on these fibres the tetraspores are borne. In tenuity of frond there is a resemblance to *G. Devonensis*, and in the pyriform articulations to *G. corallina*, but the byssoid ramuli are peculiarly its own.

G. barbata was discovered by Mr. Borrer, many years ago, cast ashore on the beach at Brighton, and for a long time our knowledge of the species rested solely on the few specimens so picked up. It is only recently that the plant has been found growing on the shores of the Channel Islands and of the north of France—the only localities hitherto recorded. One would hope that a more accurate exploration of the southern coasts of England and Ireland would, in a favourable season, reward the algologist with a new locality for so rare and so beautiful a plant.

Fig. 1. GRIFFITHSIA BARBATA :—*the natural size*. 2. Part of a frond, bearing tetraspores. 3. Apex of a branch of the same. 4. A tetraspore, attached to a fibre. 5. Part of frond with favella. 6. The favella removed. 7. Spores from the same :—*magnified*.

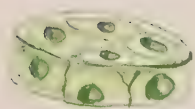


PLATE CCLXXXII.

ENTEROMORPHA RALFSII, *Harv.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour, and reticulated structure. *Fructification*: granules, commonly in fours, contained in the cells of the frond. ENTEROMORPHA (*Link*),—from *εντερον*, an *entail*, and *μορφη*, *form* or *appearance*.

ENTEROMORPHA *Ralfsii*; frond capillary, simple, or having a few short, spine-like ramuli, nearly solid, laxly reticulated; the cells large, hyaline (two to four in the breadth of the frond), each cell containing a brilliant-green grain of endochrome.

HAB. On the oozy sea-shore, above half-tide level, spreading widely. Annual. Summer. Bangor, North Wales, &c., *Mr. Ralfs*.

GEOGR. DISTR. (?)

DESCR. *Fronds* many inches long, exceedingly slender, varying from less than the diameter of human hair to nearly that of horsehair, densely aggregated, decumbent, and spreading in wide, continuous strata, which cover any object they encounter. Each frond is simple, unbranched, or rarely having a few short, spine-like ramuli scattered here and there; it is curled or flexuous, and sometimes the fronds are so much rolled together and bundled, that it is difficult to disentangle them. The cells of which the frond is composed are remarkably large, sometimes two, sometimes four forming the breadth of the filament; each cell is hyaline, glassy, somewhat distended, and contains a bright-green grain of endochrome in its centre. I have not observed any fructification.

I had prepared the plate here given for the purpose of illustrating *Enteromorpha percursa*, in the full belief that the specimens from which I made my figure were authentic examples of that species, having received them from Mr. Ralfs under that name:—but, happening to show the figure to my friend Mr. Thwaites, that acute botanist assured me that *E. percursa* was something very different. I admit that the diagnosis of *E. percursa* given by Carmichael will not apply to my plant. Of the original *E. percursa* I have, then, as yet seen no specimens, and the plate having been engraved and printed I cannot hold it back for a more minute examination and consultation. I am, therefore, compelled to publish Mr. Ralfs's plant as a novelty, and (if it be new) have great pleasure in bestowing his name

upon it. The greater number of cells in the breadth of the frond, and the presence of occasional short ramuli, would seem to be the characters by which *E. Ralfsii* is to be known from the true *E. percursa*. I have no opportunity at present (I write these lines on the shores of America) of examining other specimens, of consulting herbaria, or of communicating with more experienced botanists, and must consequently defer till a future time entering more fully into the distinctive characters of the species now proposed.

Fig. 1. Tuft of ENTEROMORPHA RALFSII:—*the natural size*. 2. Small fragments of different filaments. 3. A transverse section of a filament:—*both magnified*.



PLATE CCLXXXIII.

CHYLOCLADIA ARTICULATA, Grev.

GEN. CHAR. *Fronde* (at least the branches) tubular, constricted at regular intervals, and divided by internal diaphragms into joints, filled with a watery juice, and traversed by a few longitudinal filaments; periphery composed of small, polygonal cells. *Fructification*, of two kinds, on distinct individuals; 1, spherical, ovate, or conical *capsules* (*ceramidia*) containing a tuft of wedge-shaped spores on a central placenta; 2, tripartite *tetraspores*, immersed in the smaller branches, near their apices.—CHYLOCLADIA (Grev.),—from *χυλος*, juice, and *κλαδος*, a branch.

CHYLOCLADIA *articulata*; frond tubular, gelatinoso-membranaceous, strongly constricted throughout as if jointed, much branched, between pinnate and dichotomous, fastigiate, the upper branches often crowded; capsules obtusely conical.

CHYLOCLADIA *articulata*, Grev. in Hook. Br. Fl. vol. ii. p. 298. Wyatt, Alg. Danm. no. 73. Harv. Man. ed. 2. p. 102. Harv. in Mack. Fl. Hib. pt. iii. p. 200.

LOMENTARIA *articulata*, Lyngb. Hyd. Dan. p. 101. t. 30. Endl. 3rd Suppl. p. 43. Kütz. Phyc. Gen. p. 441.

CHONDRIA *articulata*, Ag. Sp. Alg. vol. i. p. 357. Grev. Fl. Ed. p. 291. Spreng. Syst. Veg. vol. iv. p. 342.

GIGARTINA *articulata*. Lamour. Ess. p. 49.

FUCUS *sericeus*, var. *Esper*, Ic. Fuc. vol. i. t. 82.

FUCUS *articulatus*, Lightf. Fl. Scot. p. 959. Smith, E. Bot. t. 1574. Stack. Ner. Brit. p. 28. t. 8. Turn. Syn. p. 383. Turn. Hist. t. 106.

ULVA *articulata*, Huds. Fl. Ang. p. 569.

HAB. Between tide-marks, attached to rocks and Algæ. Annual. Summer. Common.

GEOGR. DISTR. Atlantic and Mediterranean shores of Europe.

DESCR. *Root* of many branching fibres matted together. *Fronde* densely tufted, six or eight to ten inches or more in length, from a quarter line to a line in diameter, tubular, filled with watery fluid and traversed by a few fibres, constricted throughout at regular intervals into joints, the lowermost of which are cylindrical, the upper gradually more elliptical, and those of the upper branches frequently beaded;—much branched from the base, the primary branching dichotomous, the secondary often opposite or somewhat pinnated, and the ramuli frequently whorled round the nodes, particularly in the upper half of the plant:—thus old tufts often become very dense and bushy above from the inordinate number of these whorled branches and

ramuli. *Apices* fastigate, attenuate, in some varieties very much so. *Capsule* obtusely conical, scattered over the upper articulations, opening by a minute pore, the walls thick and composed of minute cells. *Tetraspores* plentifully scattered through the tissue of the articulations. *Colour* varying from a dull to a bright red, or crimson, purplish and iridescent when growing in deep water, glossy, and transparent; becoming darker when dry. *Substance* membranaceous, gelatinous within. In drying it adheres, but not strongly, to paper.

Strange to say, this plant was once regarded as a variety of *Gelidium corneum*! a blunder for which it is difficult to account, the two plants being unlike in form and substance. Stunted individuals of *Chylocladia articulata* much more closely resemble *Catenella Opuntia*, and may sometimes be mistaken for that plant, although the colour is never so lurid as it always is in the *Catenella*. An appeal to the microscope may sometimes be necessary to the young student, and then there can be no difficulty, the whole structure is so different.

Our figure represents a portion of an average-sized specimen from the west of Ireland. This plant often occurs larger—and often very much smaller and more slender. I have some curious varieties from Torquay, in which the branches are much twisted and arched, and very slender. They were matted together in crisp balls, from the excessive abundance of the upper ramuli, and could hardly be pulled asunder without tearing.

Fig. 1. CHYLOCLADIA ARTICULATA; a branch the *natural size*. 2. Small portion with capsules. 3. Section of a capsule. 4. Small portion with tetraspores. 5. A tetraspore:—*all more or less magnified*.



PLATE CCLXXXIV.

POLYSIPHONIA BYSSOIDES, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore and containing a tuft of pear-shaped spores; 2, *tetraspores*, imbedded in swollen branchlets. *Polysiphonia* (*Grev.*),—from *πολυς*, *many*, and *σιφων*, a *tube*.

POLYSIPHONIA *byssoides*; stems rigid, setaceous, cartilaginous, distichously branched, decomposito-pinnate; branches patent, more or less densely clothed with short, slender, dichotomous, single-tubed, byssoid ramelli; articulations of the stem variable in length, 3–4-striate.

POLYSIPHONIA *byssoides*, *Grev. Fl. Edin.* p. 309. *Harv. in Hook. Br. Fl.* vol. ii. p. 334. *Harv. Man. ed. 2.* p. 92. *Wyatt, Alg. Danm.* No. 85. *Harv. in Mack. Fl. Hib.* part iii. p. 209. *Endl. 3rd Suppl.* p. 46. *Kütz. Phyc. Gen.* p. 430.

HUTCHINSIA *byssoides*, *Ag. Sp. Alg.* vol. ii. p. 99.

CONFERVA *byssoides*, *Eng. Bot. t.* 547. *Dillw. Conf. t.* 48.

CERAMIUM *molle*, *Roth. Cat. Bot.* vol. iii. p. 138.

FUCUS *byssoides*, *Good. & Woodw. Linn. Trans.* vol. iii. p. 229.

HAB. On stones and shells, and various Algæ; near low-water mark and in 4–5-fathom water. Generally distributed on the English and Irish coasts;—more rare in Scotland. Orkneys, *Messrs. Thomson and M'Bain*. Frith of Forth, *Sir J. Richardson, &c.*

GEOGR. DISTR. Atlantic shores of Europe. Adriatic, *C. A. Agardh*.

DESCR. *Root* a small disc. *Fronds* from six to twelve inches long or more, as thick as hog's bristle, with an undivided stem running through the whole plant, closely set throughout with distichous, alternate branches similar to the stem, and like it furnished with a second, and in large specimens a third series of lesser branches. The lower branches are longest, the rest gradually shorter upwards, so that the general outline of a frond is broadly ovate, or pyramidal. All the branches and their divisions are clothed with short, byssoid, single-tubed, dichotomous ramelli (*leaves*), which appear to be of the same nature as the fibres in which the young branches of all *Polysiphoniæ* terminate. Every portion of the stem and branches is pellucidly articulate, the articulations 3–4-tubed, the transverse section exhibiting seven siphons; these articulations vary much in length in some specimens, being 4–6 times longer than broad, in others but twice or thrice exceeding their diameter: those of the smaller branches are usually short. *Capsules* ovate, sessile, scattered on the smaller branches. *Tetraspores* immersed in the branchlets, each formed from an articulation. *Colour* a clear and beautiful crimson lake, becoming brownish on exposure, and commonly a dark

red-brown in drying. *Substance* when young, extremely soft and flaccid, most closely adhering to paper ; when old, rigid, and coarse, with squarrose ramelli.

One of the handsomest of the British species of this extensive genus, especially when young, at which period the whole plant is of the softest substance and most delicate rosy-red colour. In some respects this species connects the genera *Polysiphonia* and *Dasya*, for here, although the tetrasporic fruit is altogether that of a true *Polysiphonia*, the habit of the frond is that of *Dasya* ; the byssoid ramelli of this species being identical with those found in the *Dasyæ*. These ramelli appear to be also of the same nature as the fibres found terminating the young branches of other *Polysiphoniæ*, as well as *Rhodomelæ*, &c., and are probably to be regarded as leaves in a very imperfect state of development. In other species they are only found on young parts, and appear to be actively engaged in the growth of the part on which they are found ; but in *P. byssoides* they exist at every period, and on all parts of the frond. On old plants or old branches, however, they lose much of their delicacy, and become harsh and squarrose.

Fig. 1. POLYSIPHONIA BYSSOIDES :—*the natural size*. 2. Portion of the frond, with *capsules*. 3. Branchlet with tetraspores. 4. A tetraspore. 5. One of the byssoid ramelli. 6. Transverse section of the stem :—*all magnified*.



PLATE CCLXXXV.

CHORDA LOMENTARIA, *Lyngb.*

GEN. CHAR. *Root* scutate. *Frond* simple, cylindrical, tubular; its cavity divided by transverse membranous septa, into separate chambers. *Fructification*, a stratum of obconical *spores* much attenuated at the base, covering the whole external surface of the frond. Among these are found elliptical *antheridia*. CHORDA (*Stack.*),—a *cord*.

CHORDA *lomentaria*; frond membranaceous, constricted at distant intervals, the interstices inflated.

CHORDA *lomentaria*, *Lyngb. Hyd. Dan.* p. 74. t. 18. *Grev. Alg. Brit.* p. 48. *Hook. Brit. Fl.* vol. ii. p. 276. *Harv. in Mack. Fl. Hib.* part 3. p. 174. *Harv. Man.* p. 35. ed. 2. p. 32. *Wyatt, Alg. Danm.* no. 6. *E. Bot. Suppl.* t. 2902. *J. Ag. Alg. Medit.* p. 45.

CHORDA *fistulosa*, *Zanard. Syn. Alg. Adr.* p. 87.

SCYTOSIPHON *lomentaria*, *Endl. 3rd Suppl.* p. 25. *J. Ag. Spec. Alg.* vol. i. p. 126.

SCYTOSIPHON *filum*, var. γ , *Ag. Spec. Alg.* vol. i. p. 162. *Ag. Syst.* p. 257.

SOLENTIA *fuscata*, *Bory, Morée*, no. 1485.

ASPEROCOCCUS *castaneus*, *Carm. Hook. Br. Fl.* vol. ii. p. 277.

CHLOROSIPHON *Shuttleworthianus*, *Kütz. Phyc. Gen.* p. 301.

HAB. On rocks, stones, and the smaller Algæ, in tide-pools. Annual. Summer and autumn. Abundant on the shores of the British Islands.

GEOGR. DISTR. Atlantic shores of Europe from Norway to Spain. Mediterranean Sea. Shores of North and South America. Japan. Southern and Antarctic Oceans.

DESCR. *Root* a minute, naked disc. *Fronds* from eight to twelve or eighteen inches in length, tapering at the base to the diameter of horse-hair, attenuated upwards, either to a bluntish or a very fine point, from two to four lines in diameter at the greatest breadth, cylindrical, constricted at irregular intervals and furnished with a transverse septum at each constriction. The walls of the tube are composed of a thick layer of large, polygonal cells, of which the outer ones are gradually smaller; on the outside of which, forming the periphery, is a stratum of radiating, close-packed, moniliform filaments. These are only found in their full development in mature specimens. *Colour* a brownish or greenish olive. *Substance* membranaceous and soft, adhering closely to paper in drying.

A common plant, of little beauty, widely dispersed through the temperate oceans of both hemispheres. In a young state no septa are visible externally, the frond being filiform. In this

condition it is sometimes a little difficult to distinguish specimens of *Chorda lomentaria*, from narrow ones of *Asperococcus echinatus*, except by their more chestnut colour and more polished surface, and Capt. Carmichael has described such individuals under the name of *A. castaneus*.

Authentic specimens of Kützing's *Chlorosiphon Shuttleworthianus*, obligingly communicated to me by that author, appear to me to belong to the very youngest state of the present plant. They were collected by Mr. Shuttleworth in the West of Ireland, where our *Chorda* is abundant.

Fig. 1. Fronds of CHORDA LOMENTARIA, of various ages;—*the natural size*.
2. Transverse section of the frond. 3. Small portion of the same;—*more highly magnified*.



PLATE CCLXXXVI.

LAURENCIA CÆSPITOSA, *Lamour.*

GEN. CHAR. *Frond* cylindrical or compressed, linear, pinnately branched, the apices obtuse; structure cellular, solid. *Fructification* of two kinds, on distinct individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, containing a tuft of pear-shaped spores; 2, triparted *tetraspores*, imbedded in the ramuli. LAURENCIA (*Lamour.*),—in honour of M. de la Laurencie, a French naturalist.

LAURENCIA *cæspitosa*; frond cylindrical or subcompressed, narrow, repeatedly pinnate, pyramidal; main branches often opposite, erecto-patent; ramuli irregularly scattered, distichous or spreading on all sides, often crowded, erect, slightly tapering to the base, truncate.

LAURENCIA *cæspitosa*, *Lamour. Ess.* p. 43. *Mont. Pl. Crypt. Canar.* p. 154. *Harv. Man.* ed. 2. p. 98.

LAURENCIA *hybrida*, *Lenorm. in Dub. Bot. Gall.* p. 951. *Harv. Phyc. Br.* vol. i. p. xiii.

LAURENCIA *pinnatifida*, γ *angusta*, *Grev. Alg. Brit.* p. 109. *Hook. Br. Fl.* vol. ii. p. 296. *Harv. Man.* p. 69. *Harv. Phyc. Brit.* pl. 55. *Wyatt, Alg. Danm.* no. 162.

FUCUS *hybridus*, *D.C. Fl. Fr.* vol. ii. p. 30.

HAB. On stones and shells, within tide-marks; rarely growing on other small Algæ. Annual. Summer. Common on the shores of the British Islands.

GEOGR. DISTR. Atlantic shores of Europe. Canary Islands. Southern Ocean.

DESCR. *Root* accompanied by creeping fibres. *Fronds* densely tufted, from two to six inches in length, about half a line in diameter, of nearly equal breadth throughout, cylindrical, or very slightly compressed, having a percurrent undivided stem, set with numerous, alternate, or rarely opposite, erecto-patent branches, the lowermost of which are longest, the upper gradually shorter, so that the whole plant has a pyramidal or conical outline. *Branches* repeatedly pinnated, their divisions naked at base, pinnated for three-fourths of their length, all the divisions very erect, blunt, or truncate, each ultimate ramulus frequently bi-trifid at the point. *Ceramidia* . . . ? *Tetraspores* confined to the apices of the ramuli, numerous, tripartite. *Colour*, when the plant grows under favourable circumstances, a very dark, lurid purple: when more exposed to the light, variously greenish or yellowish. *Substance* cartilaginous, becoming softer in fresh water, and then, under pressure, strongly adhering to paper.

I offer this species with some hesitation, as it has hitherto been generally considered by British authors a variety of *L. pin-*

natifida, under which species it is mentioned as *var. γ*, in our first volume. If we take ordinary specimens of *L. pinnatifida* and compare them with specimens of our present plant, they appear distinct enough; but narrow and ill-grown individuals of the former species come very close, it must be confessed, to the latter. The chief characters of our *L. cæspitosa* are a cylindrical frond, with alternate and very erect ramuli. The latter characters and the very lurid colour distinguish it from *L. obtusa*.

L. cæspitosa appears to have been first taken up as a species by Lamouroux, but was long neglected, or confounded with *L. dasyphylla*. The credit of restoring it to a place in the system is due to M. Montagne, who has given an excellent account of it in Mr. Webb's Nat. Hist. of the Canary Islands. It has a wide geographical range, and is tolerably abundant in the places where it occurs.

Fig. 1. LAURENCIA CÆSPITOSA :—*the natural size*. 2. Portion of a branch.
3. Apex of a branchlet, with tetraspores. 4. A tetraspore :—*all more or less highly magnified*.



PLATE CCLXXXVII.

GRIFFITHSIA SIMPLICIFILUM, *Ag.*

GEN. CHAR. *Fronde* rose-red, filamentous; filaments jointed throughout, mostly dichotomous; ramuli single tubed; dissepiments hyaline. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores* affixed to whorled involucreal ramuli; 2, gelatinous *receptacles* (*favellæ*) surrounded by an involucre, and containing a mass of minute angular spores. GRIFFITHSIA (*Ag.*) in honour of *Mrs. Griffiths*, the most distinguished of British Algologists.

GRIFFITHSIA *simplicifilum*; stems slender, irregularly branched, whorled with imbricated, straight, once-forked ramelli.

GRIFFITHSIA *simplicifilum*, *Ag. Sp. Alg.* vol. ii. p. 134. *Harv. in Hook. Journ. Bot.* vol. i. p. 301. pl. 139. *Harv. in Mack. Fl. Hib.* part iii. p. 212.

CERAMIUM *simplicifilum*, *D.C. Fl. Gall. Syn.* p. 8.

HALURUS *simplicifilum*, *Kütz. Sp. Alg.* p. 663.

HAB. On rocks, &c., near low water-mark, and at a greater depth. Annual. Very rare. On rocks near Black Castle, Wicklow, and among rejectamenta at Ardinaury Point, county Wicklow. *W. H. H.* Coast of Norfolk, *Rev. W. S. Hore*. Jersey, *Miss Turner*.

GEOGR. DISTR. Atlantic shores of France.

DESCR. *Root* clothed with matted and tangled fibres. *Stem* from four to eight or ten inches long, slender, much and irregularly branched; the branches erect, long, straight, virgate, closely whorled throughout with short ramelli. In some specimens the secondary branches are destitute of lateral branches; in others they are more or less densely set with short rudimentary branches, which are sometimes naked below, and having whorled ramelli above, and sometimes clothed with ramelli throughout. *Ramelli* from one to three lines in length, slightly imbricated, several in a whorl; straight, very erect, mostly forked near the base; rarely twice or thrice dichotomous. *Articulations* of the branches about thrice as long as broad; of the ramelli from eight to twelve times as long as broad, having a narrow band of colour with a wide hyaline border. *Fructification* not known, but probably similar to that of *G. equisetifolia*. *Colour* a bright pinky-red, given out quickly on immersion in fresh water. *Substance* membranaceous, adhering to paper, but not very strongly.

The characters by which this plant is to be known from *G. equisetifolia* are, the more slender branches, the more distant and less frequently forked, and straighter ramuli, and the greater proportionate length of the articulations. Usually the

colour of *G. simplicifilum* is much brighter than that of *G. equisetifolia*, but this character is not always to be depended upon. Perhaps the other differences mentioned are equally uncertain, and then this supposed species would be reckoned but a slender variety of *G. equisetifolia*, whose peculiar aspect was due to local circumstances. I have usually observed *G. equisetifolia* on rocky shores, exposed to considerable surf, while the most abundant locality for *G. simplicifilum*, and where it keeps all its peculiar characters without change, is on the extensive sandy beaches of Wexford, in comparatively quiet water.

Fig. 1. GRIFFITHSIA SIMPLICIFILUM:—*the natural size*. 2. Portions of a branch, *magnified*. 3. One of the ramelli:—*highly magnified*.



PLATE CCLXXXVIII.

GYMNOGONGRUS PLICATUS, *Kg.*

GEN. CHAR. *Frond* cylindrical or compressed, horny, much branched, its substance composed of densely packed filaments, of which the innermost are longitudinal, the middle curving outwards, and the external stratum (or periphery) horizontal and moniliform. *Fructification*, naked warts entirely composed of bead-like strings of cruciate tetraspores. GYMNOGONGRUS (*Mart.*),—from γυμνος, naked, and γογγυρος, a word applied by Theophrastus to wart-like excrescences on trees.

GYMNOGONGRUS *plicatus*; frond horny, cylindrical, filiform, very irregularly branched, entangled, wiry; branches sub-dichotomous; axils obtuse; ramuli often secund; fructification, oblong warts composed of obscurely-jointed filaments.

GYMNOGONGRUS *plicatus*, *Kütz. Sp. Alg.* p. 789. *Harv. Man.* ed. 2. p. 145.

GIGARTINA *plicata*, *Lamour. Ess.* p. 48. *Lyngb. Hyd. Dan.* p. 42. *Grev. Alg. Brit.* p. 150. *Hook. Br. Fl.* vol. ii. p. 301. *Wyatt, Alg. Danm.* No. 116. *Harv. in Mack. Fl. Hib.* part iii. p. 201. *Harv. Man.* p. 76.

SPHÆROCOCCLUS *plicatus*, *Ag. Sp. Alg.* vol. i. p. 313. *Syst.* p. 234.

TYLOCARPUS *plicatus*, *Kg. Phyc. Gen.* p. 411.

FUCUS *plicatus*, *Huds. Fl. Ang.* vol. ii. p. 589. *Stack. Ner. Brit.* p. 23. t. 7. *Turn. Syn. Fuc.* p. 323. *Hist.* t. 180. *E. Bot.* t. 1089. *Fl. Dan.* t. 408.

SCYTOSIPHON *hippuroides*, *Lyngb. Hyd. Dan.* p. 63. t. 14.

HAB. On rocks and stones within tide-marks, and at a greater depth. Perennial. Common.

GEOGR. DISTR. Atlantic shores of Europe and America. New Holland, *Mr. Brown*. Southern Ocean, at Kerguelen's Land, *Dr. Hooker*.

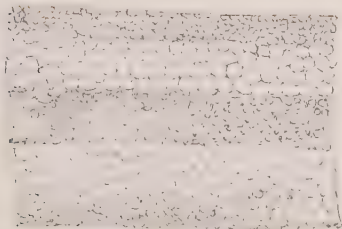
DESCR. *Fronde*s densely tufted, and often much entangled together, from six to ten inches long or more, filiform, of equal diameter throughout, as thick as hogs' bristles, or somewhat thicker, shrinking in drying, very rigid, wiry, and tenacious, much branched. *Branches* flexuous, very irregular in position and division; sometimes scattered, and sometimes densely aggregated; often secund, rarely opposite, frequently dichotomous; of various lengths, so that the tufts are never fastigate. The axils of the forkings are distinctly rounded, and the apices of the branches are all blunt. *Fructification*, wart-like excrescences of irregular form, scattered variously over the branches. I have not seen any *tetraspores* in the specimens examined. The whole substance of the wart consists of very slender, densely packed filaments. *Colour*, a dark lurid purple, fading to greenish, and even to yellow and white. The surface is singularly smooth and glossy. In drying, this plant does not adhere to paper.

There is a peculiar rigidity and wiryness in the frond of this plant, which at once distinguishes it from any other British Alga with which it can be confounded: and, when dry, the glossy surface is equally striking. It often occurs in large bundles, very much tangled together, and then looks like a mass of rigid dark-purple bristles.

I have never seen fruit perfectly ripe on any specimens that I have examined. The wart-like receptacles of fruit are common enough, but they seem to come to perfection but seldom. This is very different from the habit of *G. Griffithsiæ*, in whose *gongri* tetraspores are always found, and are some of the most beautiful of marine microscopic objects.

G. plicatus, in its geographical distribution, is almost a cosmopolite.

Fig. 1. GYMNOGONGRUS PLICATUS:—*the natural size*. 2. Magnified portion of a branch, bearing tubercles. 3. Transverse section of branch and tubercle. 4. A small segment of the same:—*more highly magnified*.



2.



PLATE CCLXXXIX.

LAMINARIA SACCHARINA, *Lamour*.

GEN. CHAR. *Frond* stipitate, coriaceous or membranaceous, flat, undivided or irregularly cleft, ribless. *Fructification*, cloudy spots of spores imbedded in the thickened surface of some part of the frond. LAMINARIA (*Lamour*.),—from *lamina*, a thin plate, in allusion to the flat frond.

LAMINARIA *saccharina*; stem cylindrical, filiform, expanding into a cartilaginous or submembranaceous, lanceolate, undivided frond.

LAMINARIA *saccharina*, *Lamour. Ess.* p. 22. *Lyngb. Hyd. Dan.* p. 21. t. 5. *Ag. Sp. Alg.* vol. i. p. 117. *Ag. Syst.* p. 272. *Hook. Fl. Scot.* part 2. p. 98. *Grev. Fl. Edin.* p. 282. *Grev. Alg. Brit.* p. 32. *Hook. Br. Fl.* vol. ii. p. 272. *Wyatt, Alg. Danm.* no. 54. *Harv. in Mack. Fl. Hib.* part 3. p. 171. *Harv. Man.* ed. 2. p. 30. *Endl. 3rd Suppl.* p. 27. *J. Ag. Sp. Alg.* vol. i. p. 134. *Kütz. Phyc. Gen.* t. 24. f. 1. *Kütz. Sp. Alg.* p. 574.

LAMINARIA *latifolia*, *Ag. Sp. Alg.* vol. i. p. 119. *Ag. Syst.* p. 272. *Grev. Alg. Brit.* p. 34. *Port. et Rupp.* p. 10. *Kütz. Syst. Alg.* p. 575.

FUCUS *saccharinus*, *Linn. Sp. Pl.* p. 1630. *Fl. Lapp.* p. 364. *Gm. Hist. Fuc.* p. 194. t. 27 & 28. *Huds. Fl. Angl.* p. 578. *Lightf. Fl. Scot.* vol. ii. p. 940. *Good. et Woodw. Linn. Trans.* vol. iii. p. 151. *Turn. Syn.* vol. ii. p. 198. *Turn. Hist.* t. 163. *Esper, Ic. Fuc.* vol. i. t. 24, 56, & 57. *Stack. Ner. Brit.* t. 9. *E. Bot. t.* 1376. *Fl. Dan.* t. 416.

HAB. Attached to rocks and stones near low-water mark, and to the depth of five to ten fathoms. Perennial. Very common all round the coast.

GEOGR. DISTR. Abundant in the Northern Ocean, extending round the world. Atlantic shores of Europe, as far as the south of France, and of North America as far as the Chesapeake (at least).

DESCR. *Root* consisting of several dichotomously branched, clasping fibres, extending from the base of the stem in a conical form, and fixed to the rock by discs or fibrils from their lower surface. *Stem* sometimes a few inches, sometimes several feet in length, from a quarter to half an inch in diameter, cylindrical, compressed above, and dilating into the base of a terminal, simple lamina. *Lamina* from one to six or even ten feet in length, and from two to twelve inches or more in breadth, lanceolate, acute or obtuse, sometimes much acuminate at the point; ovate at base when young, or more or less cuneate, rarely attenuate; the margin sometimes nearly flat and even, sometimes undulate or very much curled; the centre thicker and more opaque than the rest of the frond, and sometimes strongly rugose, with wavy transverse ribs, sometimes furrowed longitudinally at one surface of the frond and ribbed at the other, or variously bullated. *Fructification*, according to Turner, occupying irregularly shaped spots, in the centre of

the leaf, from half an inch to an inch in width, and of various lengths sometimes extending uninterruptedly throughout the frond, at other times broken without order. *Substance* varying, according to the circumstances under which the plant has been developed, from cartilaginous and coriaceous, which are most common, to delicately membranaceous. *Colour* of the leaf a deep olive, now greenish, now brownish, clear, semitransparent and glossy. As in all the *Laminariæ*, new growth in the frond takes place between the apex of the stem and base of the leaf, the upper portion of the leaf continually dropping off after the new portion is developed.

Every visitant of the sea-shore must be familiar with one form or other of this common plant, which forms a belt, about low-water mark, round all our rocky shores, where its long ribbon-like fronds wave gracefully in the water. It is by no means confined, however, within these limits, but grows in water from five to ten fathoms deep, attached to shells and stones, when rocks are not to be had. In such situations it often acquires a very large size. The variety called by Agardh *L. latifolia* delights in deep water, especially in sheltered bays and coves protected from the ocean by small islands. In many such places on the west of Ireland and Scotland, where the water is clear as crystal, the beautiful broad leaves of this variety may be seen growing luxuriantly several fathoms below the boat in which the observer is sailing over them.

A species with a simple frond and very long stem (*L. longicruris*), in many respects resembling *L. saccharina*, but readily distinguished by the stem becoming hollow, and increasing in diameter upwards, abounds in the Northern Ocean, and should be watched for on the shores of Orkney and Shetland.

Fig. 1. LAMINARIA SACCHARINA, a small specimen :—*the natural size*. 2. Thin slice :—*magnified*.



PLATE CCXC.

CODIUM BURSA, *Ag.*

GEN. CHAR. *Frond* green, sponge-like (globular, cylindrical, or flat; simple or branched), composed of tubular, interwoven, inarticulate filaments (elongated, branching cells). *Fructification*, opaque vesicles (*coniocystæ*) attached to the filaments. CODIUM (*Stack.*),—from κωδιον, the *skin of an animal*.

CODIUM *Bursa*; frond spherical, hollow.

CODIUM *Bursa*, *Ag. Sp. Alg.* vol. i. p. 457. *Ag. Syst.* p. 178. *Grev. Alg. Brit.* p. 186. *Hook. Br. Fl.* vol. ii. p. 318. *Harv. in Mack. Fl. Hib.* part 3. p. 233. *Harv. Man.* ed. 2. p. 193. *Endl. 3rd Suppl.* p. 21. *Kütz. Phyc. Gen.* p. 309. *Kütz. Sp. Alg.* p. 502.

SPONGODIUM *Bursa*, *Lamour. Ess.* p. 73.

LAMARCKIA *Bursa*, *Olivi, Zool. Adriat.* p. 258.

AGARDHIA *Bursa*, *Cabrera*, fide *Ag.*

FUCUS *Bursa*, *Turn. Hist.* t. 136. *E. Bot.* t. 2183.

ALCYONIUM *Bursa*, *Linn. Syst. Nat.* p. 1295.

BURSA marina, *C. Bauhin, Pin.* p. 368. *Ray, Syn.* p. 31. no. 3.

HAB. On submarine rocks. Perennial. Summer. Very rare.—“Coast of Sussex, plentifully,” *Pallas* (quoted by *Turner*). Shores of Cornwall, *Mr. Rashleigh*. Near Torquay, *Mrs. Griffiths*. Near Belfast, *Mr. Templeton*.

GEOGR. DISTR. Atlantic shores of France and Spain. Mediterranean and Adriatic Seas.

DESCR. *Fronds* attached to the rock by interwoven and matted fibres, several fronds growing together, spherical, hollow, varying in diameter from one to six or eight inches, soft and sponge-like, entirely composed of slender fibres closely interwoven together; those which form the groundwork of the frond matted round the inner surface of the hollow ball, and throwing out to the circumference minute club-shaped, vertical ramuli, which are closely packed together, and extend with their points erect, and sides parallel, like the threads in a pile of velvet. *Substance* soft. *Colour*, when growing, a dark, full green, becoming much paler when dry. *Fructification* not observed, but probably similar to that of *C. tomentosum*.

Not being so fortunate as to possess a British specimen of this very rare and curious plant, I have been forced to make the drawing for the plate from some of a fine series which I owe

to the kindness of M. Lenormand, who procured them at Granville, on the French coast, where *Codium Bursa* is common. The station on the Sussex coast, quoted from Pallas, is not prolific in modern times, nor have I ever seen any British specimen except a small one obtained by Mrs. Griffiths, in Devonshire. No one has met with this plant near Belfast but Mr. Templeton, and I have not seen his specimens.

Fig. 1. CODIUM BURSA, fronds :—*the natural size*. 2. Filaments of which the frond is composed :—*highly magnified*.

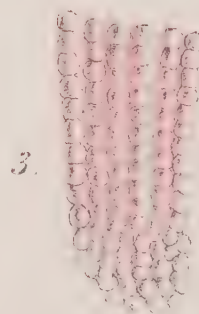


PLATE CCXCI.

MELOBESIA CALCAREA, *Ell. et Sol.*

GEN. CHAR. *Fronde* attached, or free, either flattened, orbicular, sinuated, or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*, conical, sessile *capsules* (*ceramidia*), scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores*. MELOBESIA (*Lamour.*),—from one of the sea-nymphs of Hesiod.

MELOBESIA *calcareæ*; frond unattached, stony, shrub-like, much branched; branches slender, spreading in all directions, cylindrical, anastomosing below, free above, and tapering to a blunt point; ramuli either simple or forked.

NULLIPORA *calcareæ*, *Johnst. Brit. Lith.* p. 240. t. 24. f. 4, 5.

NULLIPORA *fragilis*, *M^cCalla*.

SPONGITES *calcareæ*, *Kütz. Sp. Alg.* p. 699.

MILLEPORA *calcareæ*, *Ell. et Sol. Zooph.* p. 129. t. 23. f. 13. *Lam. An. s. Vert.* ed. 2. vol. ii. p. 312.

HAB. On shingly or sandy shores, in 5–15 fathom water. Perennial.—Coasts of South of England, and West of Scotland and Ireland, abundant in many places.

GEOGR. DISTR. Probably widely dispersed; I have specimens from New Zealand (*Dr. J. D. Hooker*), and the Galapagos Group (*Mr. Darwin*).

DESCR. *Fronde*s lying at the bottom of the sea without any attachment, heaped together in large masses, on widely spreading strata, the surface individuals of which only are alive. Each plant is from one to three or four inches in diameter, forming a roundish shrub-like mass of stony branches, which spring from a thickened centre, and extend in all directions, being more or less confluent in their lower part, but quite free above. These branches are flexuous, irregularly divided, either dichotomous or fingered, terete, gradually tapering towards the extremity, and ending in a blunt point. *Substance* stony, very brittle. *Colour*, when quite fresh, a deep blood-red, soon passing, on the death of the plant, to that of brick-dust, and, after bleaching in the sun, to a snowy whiteness. The tissues throughout the whole frond are filled with carbonate of lime, which must be removed by acid before the cells can be seen:—the latter are then found to be very minute, arranged in slender, closely-packed series or threads.

This is one of the commonest of the British deep-water species of *Melobesia*, being found in many parts of the coast, and generally

in great abundance. It forms extensive banks, on which the fronds are heaped together without order, and appear to be kept from drifting merely by their weight. The specimens at the top of the banks are alone living; those underneath, as may be at once known by their faded colour and offensive smell, are always found dead. In the West of Ireland, where this species abounds, it has been used as manure with success, being particularly suited to a peaty soil; but, as it requires to be dredged up—its weight and the depth at which it vegetates preventing its being drifted in quantity ashore,—the full use is not made of it by the peasantry which its value would seem to call for. In many districts where lime is scarce, a considerable quantity might be obtained by burning this plant. The “coral sand,” so abundantly employed on the shores of Bantry Bay, owes its fertilizing properties to the remains of Cellepores and other zoophytes, of whose débris it chiefly consists.

Fig. 1. MELOBESIA CALCAREA :—*the natural size*. 2. Portion of a branch, cut to show the internal structure :—*slightly magnified*. 3. Cells of which the frond is composed :—*highly magnified*.



PLATE CCXCII.

POLYSIPHONIA ELONGATA, *Grev.*

GEN. CHAR. *Fronde* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals; 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores*, imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from *πολυς*, *many*, and *σιφων*, a *tube*.

POLYSIPHONIA *elongata*; stems robust, cartilaginous (rarely gelatinous), irregularly branched, beset, especially towards the tips, with slender, close-set, multifid ramuli, which are attenuate to the base and apex; articulations about as long as broad (the upper ones rarely once and half to twice as long), those of the stem reticulated with veins and more or less obsolete.

POLYSIPHONIA *elongata*, *Harv. in Hook. Br. Fl.* vol. ii. p. 333. *Wyatt, Alg. Danm.* no. 40. *Harv. in Mack. Fl. Hib.* part 3. p. 209. *Harv. Man.* ed. 2. p. 86. *J. Ag. Alg.* p. 136. *Endl. 3rd Suppl.* p. 45. *Kütz. Phyc. Gen.* p. 428. *Sp. Alg.* p. 828.

POLYSIPHONIA *Ruchingeri*, *J. Ag. ! Alg. Medit.* p. 136. *Kg. ! Phyc. Gen.* p. 428. *Kg. ! Syst. Alg.* p. 829.

POLYSIPHONIA *rosea*, *Grev. ! Fl. Edin.* p.

POLYSIPHONIA *stenocarpa*, *Kg. Sp. Alg.* p. 830. (*fide sp. a Zanard.*)

POLYSIPHONIA *chalarophlæa*, *Kg. ! Sp. Alg.* p. 831.

POLYSIPHONIA *clavigera*, *Kg. Sp. Alg.* p. 831. (*fide sp. a Zanard.*)

HUTCHINSIA *elongata*, *Ag. Syn.* p. 54. *Hook. Scot.* part 2. p. 87. *Ag. Syst.* p. 152.

HUTCHINSIA *Ruchingeri*, *Ag. Sp. Alg.* vol. ii. p. 86.

CERAMIUM *elongatum*, *Roth, Cat. Bot.* vol. iii. p. 128. *Ag. Disp.* p. 19. *Lyngb. Hyd. Dan.* p. 117. t. 66. D. 1. *Grev. Fl. Edin.* p. 310.

CERAMIUM *brachygonium*, *Lyngb. Hyd. Dan.* p. 118. t. 36.

CONFERVA *elongata*, *Huds. Fl. Angl.* vol. ii. p. 599. *Dillw. Conf.* t. 33. and suppl. t. G. *E. Bot.* t. 2429.

HAB. Common on stones and shells, in pools between tide-marks, and attached to oyster and scallop shells, &c., in 5–10 fathoms water. Perennial, or at least biennial. Spring and summer.

GEOGR. DISTR. Atlantic and Mediterranean shores of Europe. North America.

DESCR. *Root* a small disc. *Fronde*s solitary, or a few together, but scarcely tufted, from six to twelve inches high, robust, varying in diameter from the thickness of hog's bristle to that of the antenna of a lobster, rising with an un-

divided stem for an inch or two, then much branched and bushy. *Branches* long, sometimes rod-like and scarcely divided, sometimes repeatedly dichotomous or alternately branched; at other times fasciculate or very irregular in division;—now nearly or quite destitute of ramuli, again densely clothed with them, always attenuated at the base, just at the insertion, and tapering at the apex to a fine point. *Ramuli* narrow-spindle-shaped, tapering much to the base and apex, and ending in short fibrils, scattered or crowded, from a quarter to half an inch long or more, not abundant the first season, but very luxuriant in plants of the second year, always softer and of more intense colour than other parts of the frond. *Articulations* of the stem and branches more or less opaque, but generally visible, coated with small, sinuous cells, shorter than their diameter; those of the tips of the branches and ramuli more transparent, as long, or once and half, sometimes twice as long, as broad, marked with more parallel tubes, and having transparent dissepiments. *Capsules* ovate, sessile or slightly stalked. *Tetraspores* large, contained in swollen and distorted ramuli. *Substance* of the stem cartilaginous and stiff,—of the ramuli very soft and gelatinous:—in some deep-water varieties (*P. rosea*) the whole plant is flaccid and gelatinous. *Colour* of the ramuli a fine crimson-lake, of the stem and branches dark red or brown.

For remarks, see the following Plate.

Fig. 1. POLYSIPHONIA ELONGATA, plant of the first year:—*the natural size*.
2. Branchlets of the same. 3. Apex of a branchlet. 4. Portion of the stem. 5. Cross section of the stem. 6. Ceramidia and spores:—*magnified*.



PLATE CCXCIII.

POLYSIPHONIA ELONGATA, *Grev.*

(For description, see last page.)

In last plate we have figured the ordinary form of *P. elongata* (*Lobster-horns*) in plants of the first season; and our present plate represents a plant of the second year's growth. In winter the tips of the branches and ramuli of the first year fall away, leaving a stunted and broken frond, very unsightly and often distorted: this constitutes *Ceramium brachygonium* of Lyngbye. Early in spring, new growth commences;—the broken branches put forth vigorous shoots, ending in broad pencils of crimson ramuli, which in a short time clothe the whole upper part of the frond in the rich costume which we have endeavoured here to portray. These different aspects of the species are puzzling to a young observer, who is apt to take a plant of the second year for a different species;—but were these the only difficulties connected with *P. elongata*, a little practice would soon enable the young botanist to surmount them:—for similar changes from winter to summer occur in many other Algæ, as *Rhodomela subfusca*, *Desmarestia aculeata*, &c., and are no other than what continually pass under our eye in the case of land plants whose leaves are deciduous.

But unfortunately, *P. elongata* varies in other respects, as may be inferred from the several synonyms which I have enumerated, a list that would probably be extended had I the advantage of consulting authentic specimens of several other reputed species. The form called *P. Ruchingeri*, originally found in the Adriatic, is common enough on our coast, and differs from ordinary *P. elongata* in being much more slender, of less cartilaginous substance, and especially in having longer articulations. I have examined authentic specimens communicated by Prof. J. Agardh,

and failed to detect any character which may not be found more or less strongly marked in some specimens of *P. elongata*, so that these two forms are easily traced into one. Of the three species quoted from Kützing, I have only seen one authentically named; the other two were communicated by M. Zanardini, on whose authority my specimens rest. Judging by the specimens I have examined, as well as by the descriptions given by Kützing, I have no hesitation in referring them to *P. elongata*; and probably several other species described by Kützing in the same section might also be added without impropriety.

Dr. Greville's *P. rosea* has much more the aspect of a distinct species than any of those already alluded to. It seems confined to deep water, and is much more flaccid than ordinary *P. elongata*, almost gelatinous, closely adhering to paper in every part, and of a brilliant rosy crimson colour. It was first found by Sir John Richardson among rejectamenta in the Frith of Forth, and has been more recently dredged near Carrickfergus by the late Mr. M'Calla, from whom I have excellent specimens.

I should mention another plant recently found in Cork Harbour by Lady Louisa Tenison, which seems almost intermediate between *P. elongata* and *P. elongella*, but different from both. At present I hold it over for future determination. *P. Grevillii*, Harv., appears, from a recent analysis, to be nothing more than *P. violacea*, of a brighter red colour than usual.

Fig. 1. POLYSIPHONIA ELONGATA, a plant of the second year:—*the natural size*. 1. Ramulus with ceramidia. 3. Portion of one of the smaller branches. 4. Transverse section of the same. 5. Ramuli with *tetraspores*:—*all magnified*.



PLATE CCXCIV.

CLADOPHORA FRACTA, *Kg.*

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch*, and φέρω, to *bear*.

CLADOPHORA *fracta*; tufts irregular, entangled, often detached and then forming floating strata, dull green; filaments somewhat rigid, distantly branched, the lesser branches somewhat dichotomous, spreading, with very wide axils, the ramuli few, alternate or commonly secund; articulations from three to six times as long as broad, at first cylindrical, then elliptical, with contracted dissepiments.

CLADOPHORA *fracta*, *Kütz. Phyc. Gen.* p. 263. *Kütz. Sp. Alg.* p. 410. *Harv. Man.* ed. 2. p. 206.

CONFERVA *fracta*, *Fl. Dan.* t. 946. *Dillw. Conf.* t. 14. *E. Bot.* t. 2338. *Web. et Mohr, Gr. Conf.* t. 14. *Roth, Cat. Bot.* vol. iii. p. 230. *Ag. Disp.* p. 31. *Ag. Syst.* p. 109. *Lyngb. Hyd. Dan.* p. 152. t. 52. *Harv. in Hook. Br. Fl.* vol. ii. p. 356. *Harv. Man.* ed. 1. p. 134. *Harv. in Mack. Fl. Hib.* part 3. p. 227.

CONFERVA *divaricata*, *Roth, Cat. Bot.* vol. i. p. 179.

CONFERVA *vagabunda*, *Huds. Fl. Angl.* vol. ii. p. 601. *Lightf. Fl. Scot.* vol. ii. p. 990. *Dillen. Hist. Musc.* t. 5. f. 32.

CONFERVA *hirta*, *Fl. Dan.* t. 947.

CONFERVA *flavescens*, *Wyatt, Alg. Danm.* no. 224. (*not of Roth.*)

HAB. In ditches of brackish water, communicating with the tide; also in fresh-water lakes, ditches, and streams. Common.

GEOGR. DISTR. Abundant throughout Europe.

DESCR. At first forming loose tufts, which frequently become detached, and the plant is more commonly found constituting floating strata, many tufts entangled together in each floating mass. *Filaments* capillary, from six to eight or ten inches long, much, but very irregularly branched, the branches distant, spreading at wide angles, or much divaricated, either dichotomous or alternate; the lesser branches repeatedly forked, with wide axils, and the ramuli, which are few and very patent, commonly secund, sometimes alternate. *Articulations* three or four times as long as broad, rarely six times as long, those of the upper branches pretty uniformly thrice as long as their diameter, at first cylindrical, then becoming pyriform, and when mature elliptical, when the branches resemble strings of dark-green beads. *Dissepiments* finally much contracted. *Colour* at first a pleasant grass-green, becoming darker and duller as the plant advances in age. The en-

dochrome is at first fluid, but in the full-grown articulations (which are in fact changed into *sporangia*) it becomes distinctly granular, very dense, and of a dark colour. In drying the plant adheres to paper, but not very firmly.

The occasional occurrence of this species in salt-water ditches near the coast gives it a claim to be admitted into the present work, similar to that allowed in the cases of several other of these brackish-water plants. *C. fracta* is rarely found attached. It is more commonly met with heaped together in widely extending strata, covering the surface of the water. Sometimes in lakes, as it thus floats about, it becomes rolled together in dense balls, which have a good deal of the aspect of *C. ægagropila*, but not the same regularly radiant structure. When fully developed and in mature fruit, the middle portion of the frond is very frequently entirely converted into a string of *sporangia*, and is then a beautiful and characteristic microscopic object, which it is impossible to mistake for anything else. When not in fruit, *C. fracta* is more easily known from *C. flavescens*, which is closely allied to it, by the shorter articulations, than by any other character.

Fig. 1. Part of a floating mass of CLADOPHORA FRACTA :—*the natural size*.
2. Branches of the same :—*magnified*. 3. Small portions in a young and a mature state :—*highly magnified*.

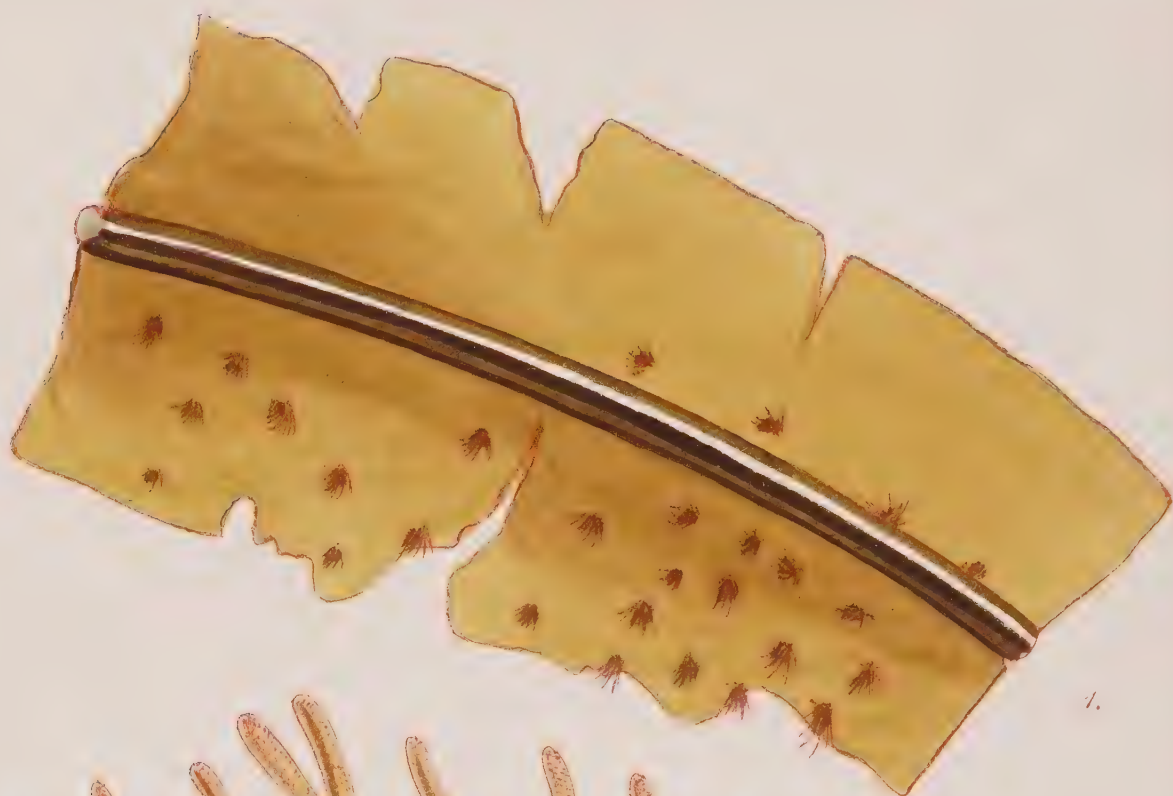


PLATE CCXCV.

LITOSIPHON LAMINARIÆ, *Harv.*

GEN. CHAR. *Frond* unbranched, cylindrical, filiform, cartilaginous, sub-solid, at length tubular, composed of several rows of cells; the surface areolated. *Fructification* solitary or aggregated, naked *spores*, scattered irregularly over the surface of the frond. LITOSIPHON (*Harv.*),—from *λιτος*, *slender*, and *σιφων*, *a tube*.

LITOSIPHON *Laminariæ*; fronds stellately tufted, short, cylindrical, blunt, slightly tapering at the base, smooth (or hairy toward the apex), transversely banded, the bands close together; spores scattered, or several in each transverse band.

LITOSIPHON *Laminariæ*, *Harv. Man.* ed. 2. p. 43.

DESMOTRICHUM *Laminariæ*, *Kütz. Sp. Alg.* p. 470.

CHLOROSIPHON *Laminariæ*, *Harv. in Phyc. Brit.* vol. i. p. x. (*list of species.*)

BANGIA *Laminariæ*, *Lyngb. Hyd. Dan.* p. 84. t. 24. *Ag. Syst.* p. 75. *Hook. Br. Fl.* vol. ii. p. 316. *Harv. in Mack. Fl. Hib.* part 3. p. 241. *Harv. Man.* ed. 1. p. 172.

ASPEROCOCCUS? *Laminariæ*, *J. Ag. Sp. Alg.* vol. i. p. 79.

HAB. Parasitical on the fronds of *Alaria esculenta*, common on that plant in the summer and autumn. Annual.

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. *Fronds* from a quarter to half an inch in length, cylindrical, slightly tapering at the base, then of nearly equal diameter upwards, and ending in a blunt point, smooth, or beset toward the summit with slender pellucid fibres, at first solid, becoming hollow in age from the perishing of the central cells. *Structure* built up of two or three or more layers of concentric cells; those of the outer circle, or periphery, about as long as broad, placed tier above tier in regular circles, so that the frond appears as if transversely striate or banded. The cells sometimes separate into four smaller cells, which occupy the space of one large cell. *Spores*? scattered, one or more in each transverse band, each spore formed from a cell of the band, become enlarged and prominent. *Colour*, when young, a clear olive, becoming brown in age. *Substance* soft, adhering to paper.

This poor little plant has been sadly tossed about among botanists from one part of the system to the other, nor is it yet very certain whether it will be allowed to bear the name under which it is now described, or whether that must be changed into *Desmotrichum*. Should it be found, on comparison, to agree in

structure with the other species so named, our genus *Litosiphon*, which has been formed to include the present plant and the *Asperococcus pusillus*, Carm. (Pl. CCLXX.), must probably be given up. By Kützing these plants are, however, widely separated, *A. pusillus* being associated with the *Chlorosiphon Shuttleworthianus* of that author, a production which I regard as merely the very young state of *Chorda lomentaria*. I cannot consent to separate these parasites, which appear to me to have a close relationship and similar structure.

By its first discoverer our *L. Laminariæ* was placed in *Bangia*, which was then a common receptacle for any filiform plant marked with transverse, closely-set bands of cells. Here for a long time it was suffered to remain unmolested, though almost every author who subsequently described it agreed in pronouncing that it had no natural affinity with the type of the genus *Bangia*, and was even referable to a different *Series* or great division of the Algæ. Still no one, till recently, took any active step in the matter. Many years ago, Mr. David Moore remarked the affinity of *Bangia? Laminariæ* with *Asperococcus pusillus*, and suggested the propriety of forming a genus for their reception, a suggestion which I recorded with approbation in the first edition of the Manual (p. 173), but did not then adopt. Mr. Moore is therefore properly the originator of the present generic group, to which I have now merely given a name.

Fig. 1. Portion of the frond of *Alaria esculenta*, with tufts of LITOSIPHON LAMINARIÆ growing on it:—the natural size. 2. Tuft of fronds. 3. Apex of a frond. 4. Base of the same. 5. Part of the middle portion of the same:—all more or less highly magnified.



PLATE CCXCVI.

CALLITHAMNION PLUMA, *Ag.*

GEN. CHAR. *Fronde* rosy or brownish-red, filamentous; stem either opaque and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants; 1, external *tetraspores* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish, or lobed, berry-like *receptacles* (*favellæ*) seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*),—from *καλλος*, *beauty*, and *θαμνιον*, a *little shrub*.

CALLITHAMNION *Pluma*; stems rising from creeping filaments, erect, sub-simple, or alternately branched; branches naked below, the upper half pinnated with short, erect, closely set, opposite ramuli; articulations from two to four times as long as broad; tetraspores globose, either terminating shortened pinnules, or placed on little stalks near the base of the pinnule.

CALLITHAMNION *Pluma*, *Ag. Sp. Alg.* vol. ii. p. 162. *Harv. in Hook. Br. Fl.* vol. ii. p. 340. *Harv. in Mack. Fl. Hib.* part 3. p. 217. *Harv. Man.* ed. 2. p. 173. *E. Bot. Suppl.* t. 2894. *Endl. 3rd Suppl.* p. 34. *Kütz. Sp. Alg.* p. 647.

CALLITHAMNION *Plumula*, β *pusillum*, *Lyngb. Hyd. Dan.* p. 127. t. 39.

CERAMIUM *Pluma*, *Ag. Syst.* p. 132.

CONFERVA *Pluma*, *Dillw. Conf.* p. 119. tab. F.

HAB. Parasitical on the stems of *Laminaria digitata*, rather rare. Annual. Summer. Bantry Bay, *Miss Hutchins.* Malbay, *W. H. H.* Appin, *Capt. Carmichael.* Probably overlooked on other parts of the coast.

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. Forming velvety patches of some extent on the surface over which it spreads. *Fronde*s rising from prostrate, creeping filaments, erect, from a quarter to half an inch or rather more in height, very slender, simple, or furnished with alternate or opposite, very erect branches: sometimes, in luxuriant specimens, almost bushy. *Branches* naked in their lower half, closely feathered above with opposite, erect, simple, straight ramuli, a pair of which issue from every articulation of the branch: ramuli, from suppression, sometimes alternate or secund. *Articulations* of the stem from three to four times longer than broad, of the branches shorter; those of the ramuli frequently scarcely exceeding their diameter in length. *Tetraspores* globose, either borne on short, proper pedicels, which rise, singly or in pairs, near the base of the pinnules, or terminating a shortened pinnule:

in the former case each tetraspore is usually accompanied by a short unaltered cell or subtending ramulus. *Colour*, a fine, clear, crimson lake. *Substance* membranaceous, adhering to paper.

A beautiful little parasite, discovered originally by the late Miss Hutchins on the shores of Bantry Bay, and since detected in many distant points of the coast of Europe. It seems to be pretty much confined to the stems of *Laminaria digitata*, which it sometimes clothes in patches, looking like shreds of crimson velvet. Dillwyn's figure represents the upright stem as perfectly simple, the whole plant strictly resembling a little feather. I have sometimes met it so, but it is more usual to find one or two branches rising from the lower part, as shown in our figure. Among Capt. Carmichael's MSS. is a figure showing a much more compound state of this plant noticed by him on the west of Scotland, and this figure closely agrees with the description given by Lyngbye and Agardh of the species as it occurs in the north of Europe. *C. Pluma* is nearly allied to *C. Turneri*, from which it chiefly differs in the smaller size and shorter articulations, and in having the lower part of the stem and branches constantly naked.

Fig. 1. Patch of CALLITHAMNION PLUMA growing on the stem of *Laminaria digitata* :—*the natural size*. 2. Fronds from the same :—*magnified*. 3. Ramulus, with a tetraspore. 4. Apex of a young frond :—*both highly magnified*.

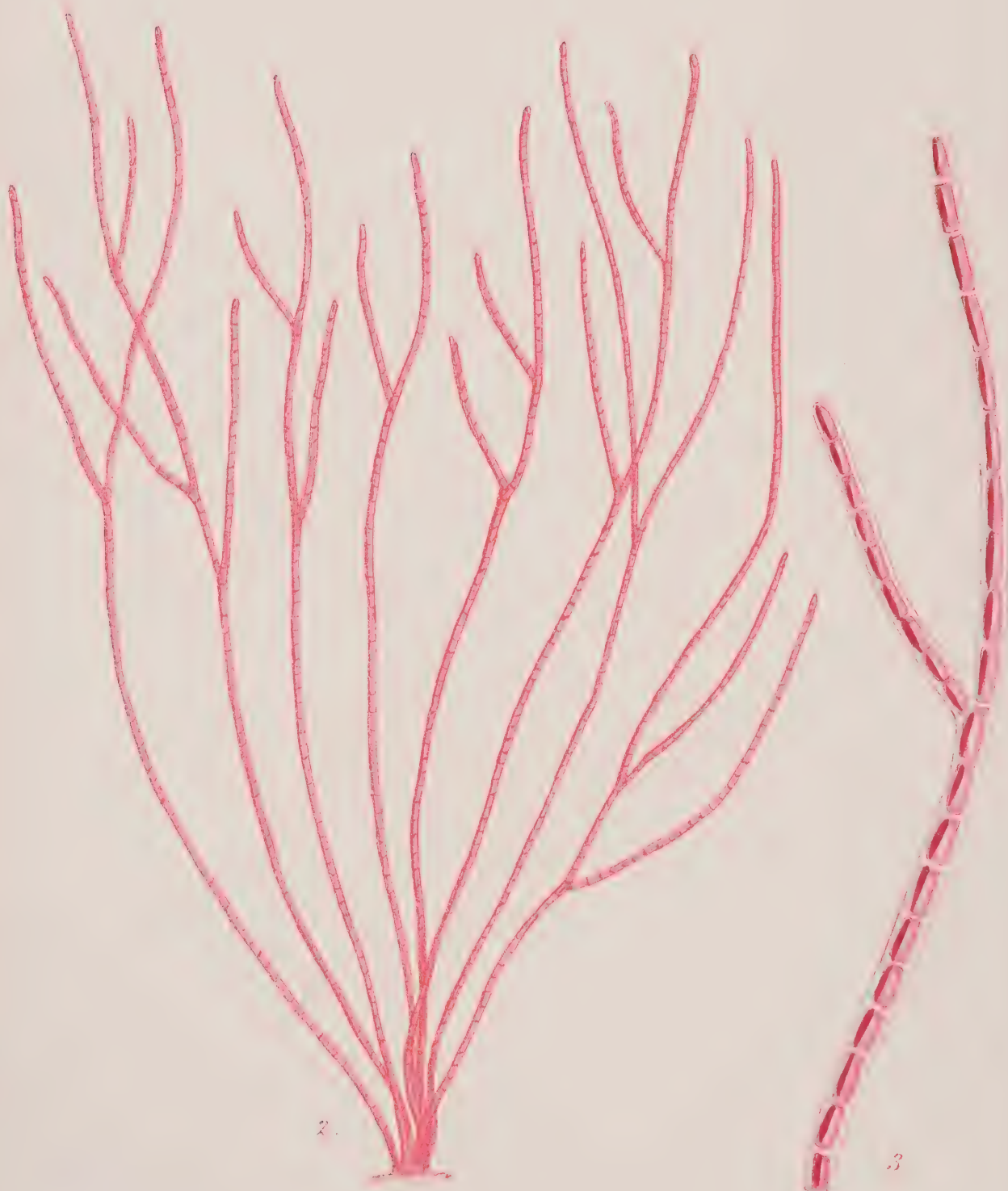


PLATE CCXCVII.

CALLITHAMNION SPARSUM, *Harv.*

GEN. CHAR. *Fronde* rosy or brownish-red, filamentous; stem either opaque and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants: 1, external *tetraspores* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like *receptacles* (*favellæ*) seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*), —from *καλλος*, *beauty*, and *θαμνιον*, a *little shrub*.

CALLITHAMNION *sparsum*; parasitical, minute; filaments tufted, scattered, sparingly branched; branches spreading, unequal; articulations twice or thrice as long as broad; tetraspores “obovate, sessile, mostly axillary.” (*Carm.*)

CALLITHAMNION *sparsum*, *Harv. in Hook. Br. Fl.* vol. ii. p. 348. *Harv. Man.* ed. 2. p. 184. *Kütz. Sp. Alg.* p. 643.

CALLITHAMNION *floridulum*, *Lyngb. Hyd. Dan.* p. 130. t. 41. (*not of Phyc. Brit.*)

TRENTEPOHLIA *sparsa*, *Harv. in Mack. Fl. Hib.* part 3. p. 219.

HAB. On old stems of *Laminaria saccharina* at Appin, *Capt. Carmichael*.
On *Cladophora rupestris* at Miltown Malbay, *W.H.H.*

GEOGR. DISTR. Shores of Greenland, *Gieseke*.

DESCR. *Fronde*s forming small, scattered tufts, one or two lines in height and as much in diameter, composed of erect, closely-set filaments. *Filaments* nearly simple, or furnished with two or three simple, alternate or secund branches, equalling the main filament in diameter, cylindrical, obtuse. *Articulations* about once and a half as long as broad, with pellucid dissepiments. *Tetraspores* (which I have not seen) “obovate, sessile, mostly axillary.” (*Carm.*) *Substance* membranaceous. *Colour* a clear crimson-red.

A minute and little known, but perhaps not uncommon species, in many respects allied to *C. Daviesii*, and in some approaching *C. Rothii*, but differing from both in the very simple filaments and flexuous branches. I have made my drawing from a part of Captain Carmichael's original specimen, preferring to use, in this

instance, materials about which there could be no mistake ; but I have not been able to find, on the portion examined, the axillary tetraspores which that observer describes. Such characters as the barren filaments supply are faithfully given in the annexed plate.

Fig. 1. Tufts of *CALLITHAMNION SPARSUM*, growing on an old stem of *Laminaria* :—*natural size*. 2. A few fronds from one of the tufts. 3. Portion of a branch :—*more or less magnified*.



PLATE CCXCVIII.

CLADOPHORA FLAVESCENS, *Kg.*

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch*, and φέρω, to *bear*.

CLADOPHORA *flavescens*; forming pale yellowish strata; filaments slender, sparingly branched; branches alternate or subdichotomous, erecto-patent, with scattered, elongate, alternate or secund ramuli; articulations from eight to nine times as long as broad.

CLADOPHORA *flavescens*, *Kg. Phyc. Gen.* p. 267. *Harv. Man.* ed. 2. p. 206. *Kg. Sp. Alg.* p. 402.

CONFERVA *flavescens*, *Roth. Cat. Bot.* vol. ii. p. 224. vol. iii. p. 241. *Fl. Germ.* vol. iii. pars 1. p. 511. *Dillw. Conf.* p. 64. t. E. *E. Bot.* t. 2088. *Ag. Syst.* p. 112?

HAB. In ditches or pools of brackish or fresh water. Annual. Summer.

GEOGR. DISTR. Europe.

DESCR. This species grows in continuous tufts, which, as they rise to the surface, form extensive floating strata covering the pool. *Filaments* slender, capillary, tangled together, irregularly branched; the main thread somewhat dichotomous, with widely-spreading axils, and often bent in an angular manner first to one side, then to the other: the lateral branches alternately divided, patent, with a few distant, scattered, alternate or secund ramuli. *Articulations* cylindrical, many times longer than broad, filled with a pale, granular endochrome. *Colour* when young a yellowish green, becoming yellower in age, and at last almost golden. When dry it has a silky appearance, and fades in the herbarium to a yellowish white. *Substance* soft, membranous, but not strongly adhering to paper.

In a recent number we gave a figure of *Cladophora fracta*, a species nearly related to the plant now described, and inhabiting similar places. Both species frequently fill the pools in which they grow, and, rising in the water, cover the surface with a thick fleece, under which large bubbles of air, a portion of which is oxygen disengaged by the plant under the influence of light,

are confined. *C. flavescens*, besides its paler green colour, is readily distinguished from *C. fracta* by the much longer articulations, and their less granular contents. The specimens published under the name of *C. flavescens* in Mrs. Wyatt's fasciculi are, in my copy at least, *C. fracta*.

Fig. 1. Tuft of CLADOPHORA FLAVESCENS :—*natural size*. 2. Portion of filaments, to show the branching. 3. Ramulus, to show the character of the articulations :—*both magnified*.



PLATE CCXCIX.

POLYSIPHONIA FASTIGIATA, *Grev.*

GEN. CHAR. *Fronde* filamentous, partially or generally articulate; articulations longitudinally striate, composed of numerous, radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores*, imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from *πολυς*, *many*, and *σιφων*, a *tube*.

POLYSIPHONIA *fastigiata*; filaments rigid, setaceous, of equal diameter throughout, forming globular, fastigate tufts, many times dichotomous; the axils patent; articulations shorter than their diameter, multistriate, with a dark central spot; siphons from sixteen to eighteen.

POLYSIPHONIA *fastigiata*, *Grev. Fl. Edin.* p. 308. *Harv. in Hook. Br. Fl.* vol. ii. p. 333. *Harv. in Mack. Fl. Hib.* part 3. p. 209. *Harv. Man.* ed. 2. p. 92. *Wyatt, Alg. Danm.* no. 177. *Endl. 3rd Suppl.* p. 45. *Kütz. Sp. Alg.* p. 809. *Kütz. Phyc. Gen.* p. 420: t. 50. f. 3.

HUTCHINSIA *fastigiata*, *Ag. Syn.* p. 53. *Hook. Fl. Scot.* part 2. p. 87. *Ag. Syst.* p. 154. *Lyngb. Hyd. Dan.* p. 108. t. 33. *Ag. Sp. Alg.* vol. ii. p. 67.

CERAMIUM *fastigiatum*, *Roth, Fl. Germ.* vol. iii. p. 463. *Cat. Bot.* vol. iii. p. 157.

CONFERVA *polymorpha*, *Linn. Syst. Nat.* vol. ii. p. 721. *Fl. Dan.* t. 395. *Dillen. Musc.* t. 6. fig. 35. *Ellis, Phil. Trans.* vol. lvii. p. 426. t. 18. fig. a. A. b. B. *Huds. Fl. Angl.* vol. ii. p. 599. *Lightf. Fl. Scot.* vol. ii. p. 989. *Dillw. Conf.* t. 44. *E. Bot.* t. 1764.

FUCUS *lanosus*, *Linn. Syst. Nat.* vol. ii. p. 718. *Huds. Fl. Ang.* vol. ii. p. 590.

HAB. Parasitical on the littoral *Fuci*, especially upon *Fucus nodosus*. Perennial. Summer and autumn. Very uncommon.

GEOGR. DISTR. Atlantic shores of Europe and North America. Baltic Sea.

DESCR. *Root* a minute disc. *Fronde*s forming dense, globular, fastigate tufts, from one to two or three inches in diameter. *Filaments* as thick as horse-hair below, slightly attenuated upwards, excessively branched from the base, dichotomous, either bare of lateral ramuli or furnished with a greater or less number, which are short and once or twice forked. *Apices* spreading, of nearly equal length, subulate; axils acute. Articulations shorter than their length, with hyaline dissepiments, many-striate and marked with a dark, central spot, being a bag of coloured endochrome which fills the central tube or cavity of the frond: radiating cells from sixteen to eighteen. *Capsules* ovate, near the tips of the branches, formed from the

metamorphosis of one of the prongs of the terminal forks. *Tetraspore* immersed in the terminal ramuli. *Antheridia* abundant in winter and spring, bright yellow, crowded close to the ends of the branches, oblong, affecting the colour of the tuft by their abundance. *Substance* rigid, not adhering to paper, except after long steeping. *Colour* a rich vandyke brown, becoming foxy in age or decay.

A very common species on the shores both of Europe and of North America, almost invariably infesting *Fucus nodosus* with its dark brown bushy tufts. Occasionally I have seen it growing on *F. serratus* and *F. vesiculosus*, but it is much less common on them. On the contrary, wherever *F. nodosus* occurs, there it is accompanied by this parasite. *Pol. fastigiata* grows nearer to high-water mark than any others of the genus, and is generally exposed, for many hours of each tide, to the influence of the air. This exposure and the constant alternation of circumstances probably influence the colour of its frond, and we accordingly find that it partakes of the *brown* tints of the *Fuci* among which it grows, almost to the entire extinction of the red colour, proper to the family to which its structure allies it. Besides this difference of colour, it differs from most others of its genus in having a cell, containing endochrome, within each articulation of the central or axial tube. In this respect it partakes of the character of *Bostrychia*, with which genus its colour and habitat strongly connect it. The *antheridia* are particularly abundant and of large size; and at the season when they are developed the tufts become of a yellow or orange colour. Almost every point of the branches bears its tuft.

It is difficult to account for the specific name, *polymorpha*, under which it was designated by Linnæus, for few species among the marine Algæ are less inconstant in character.

Fig. 1. Tufts of POLYSIPHONIA FASTIGIATA growing on *Fucus nodosus*:—the natural size. 2. Portion of a frond, to show branching. 3. Ceramidia. 4. Branchlet with imbedded tetraspores. 5. A tetraspore. 6. Apices with antheridia. 7. An antheridium. 8. Portion of a frond, partly cut longitudinally to show the internal structure. 9. A transverse section of a frond:—all magnified.



PLATE CCC.

LYNGBYA ? FLACCA, *Harv.*

GEN. CHAR. *Filaments* destitute of a mucous layer, free, flexible, elongated, decumbent, not oscillating. *Tube* continuous; endochrome green or purple, densely annulated and finally separating into lenticular sporidia. LYNGBYA (*Ag.*),—in honour of *Hans Christian Lyngbye*, author of an excellent work on the Algæ of Denmark.

LYNGBYA ? *flacca*; filaments short, tufted, straight or gently curved, simple, or having a few slender, proliferous, subulate, root-like ramuli, articulated; articulations shorter than their diameter, the endochrome at length contracting into a small central sporidium.

LYNGBYA ? *flacca*, *Harv. in Phyc. Brit. list*, vol. i. p. xv. *Harv. Man.* ed. 2. p. 227.

HORMIDIUM *flaccum*, *Kütz. Phyc. Gen.* p. 244.

HORMOTRICHUM *flaccum*, *Kütz. Sp. Alg.* p. 381.

CONFERVA *flacca*, *Dillw. t.* 49. *E. Bot. t.* 1943. *Harv. in Hook. Br. Fl.* vol. ii. p. 354. *Harv. Man.* ed. i. p. 131.

HAB. Parasitical on various small Algæ in tide-pools; on the *Fuci*, and growing also on floating timber. Annual. Summer. Not uncommon.

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. *Filaments* from half an inch to an inch and a half in length, forming wide patches on floating timber, or covering various algæ with a silken beard, fixed at base, freely floating in the water; straight or gently curved, either quite simple or throwing out, here and there, a few slender, subulate, root-like processes, which seem to be a viviparous growth of the sporidium contained within the tube. *Articulations* rather well defined, shorter than their diameter, with a wide border; the endochrome at first filling the cell, but soon contracted, and then forming a small lenticular sporidium in the centre of the transparent articulation. *Colour* a beautiful grass-green. *Substance* lubricous and soft, closely adhering to paper in drying.

In the last edition of the Manual I have divided the genus *Lyngbya* into two sections, to the latter of which the species now described belongs, as well as *L. Carmichaelii* and *L. speciosa*, which have already been figured in this work. A better course would probably have been to have adopted Kützinger's

genus *Hormotrichum* for this latter group, adding to it, as that author has done, *Conferva bangioides*, *C. Youngana*, and probably *C. collabens*, a species of which but little is yet known. In any future work I should probably bring these species together under one generic head, as they certainly have characters in common with each other, and such of them as have, like the present, been classed with the *Lyngbyæ* differ from the type of that genus in having a distinctly articulated filament.

I have frequently observed *C. flacca* put forth the root-like, proliferous branches given in our plate.

Fig. 1. Tufts of *LYNGBYA FLACCA* growing on *Hypnea purpurascens*:—*natural size*. 2. Portions of filaments from the same:—*highly magnified*.

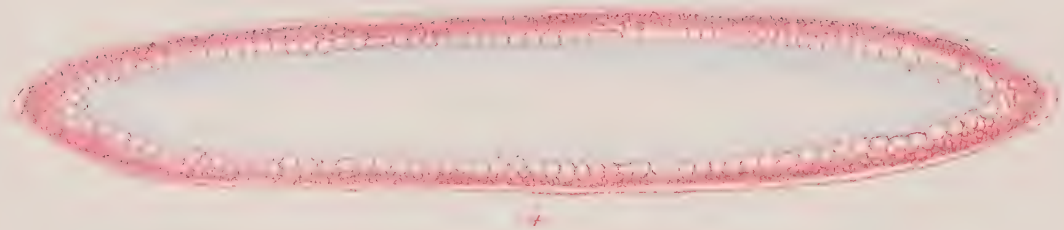


PLATE CCCI.

CHRYSYMENIA ROSEA,

Var. ORCADENSIS, *Harv.*

GEN. CHAR. *Frond* tubular, continuous (not constricted or jointed), filled with a watery juice, and traversed by a few longitudinal filaments; its walls composed of several rows of cells, the innermost of which are distended and much elongated, the outer gradually smaller, and the superficial ones very minute. *Fructification*: 1, *ceramidia*, containing a very dense tuft of angular spores; 2, triparted *tetraspores*, immersed in the ramuli. CHRYSYMENIA (*J. Ag.*),—from χρυσῆος, *golden*, and ὑμν, a *membrane*; because the species assume golden tints if steeped for some time in fresh water.

CHRYSYMENIA *rosea*, var. *Orcadensis*; fronds distichous, pinnate, or bipinnate, the main stem and the pinnæ and pinnules elliptic-oblong, compressed; pinnæ opposite.

CHRYSYMENIA *Orcadensis*, *Harv. Man.* ed. 2. p. 100.

HAB. On rocks and Algæ in deep water. Annual? At Skaill, Orkney, *Miss Watt*. On a root of *Laminaria digitata*, adhering to a large stone, dredged in eight fathoms, Sanda Frith, Orkney (growing with *Rhodymenia cristata*), *Messrs. Thomas and M'Bain*.

GEOGR. DISTR. Only known in the above localities.

DESCR. *Root* fibrous, branching. *Fronds* (in the only specimens yet seen) from three-quarters of an inch to an inch and a half in height, a quarter of an inch in breadth, compressed, undivided, oblong, rounded, or bluntly pointed, but not attenuated at the summit, once or twice pinnate with similarly-shaped frondlets. *Frondlets* opposite, at first ovate, becoming oblong as they grow, distichous. *Substance* delicately membranaceous, closely adhering to paper. *Colour* a bright rosy red, preserved in drying. *Fructification* unknown.

When the plate now given was prepared and lithographed, I was only acquainted with the few imperfect specimens first discovered, and noticed, under the provisional name "*Orcadensis*," in the recently published edition of the 'Manual'; but within the last month (August) two obliging correspondents, Mrs. Gatty

and Mrs. Hayden, have communicated more perfect specimens gathered at Filey, on the Yorkshire coast, in July 1850, which seem to connect the Orkney plant with an American species gathered at Newport, Rhode Island, to which I had previously given the name "*rosea*." The Orkney plant, here figured and described, if not a distinct species, is still so much broader than either the American or the Yorkshire plants that it may be retained as a well-marked variety. Our figure is, however, so imperfectly characteristic of the species, that another will be desirable, which we trust to give before the close of the work, and, to afford time for discovery, both to our Orkney and Yorkshire friends, shall defer it to the latest practicable period.

Mrs. Gatty's largest specimen, most kindly placed at our disposal, so nearly resembles one of the American specimens that it might have been supposed to be from the same locality; while Mrs. Hayden's in its rather broader frond approaches the Orkney form. Mere *breadth* of frond is an uncertain character: a better distinction between this species and *C. clavellosa* lies in the more elliptical and obtuse ramuli, which are greatly more constricted at the insertion. Another character is pointed out by Mrs. Gatty, whose specimen bears tetraspores,—namely, that these are collected into several distinct *sori*, not dispersed through the branchlets, or forming one general sorus.

Fig. 1. Plants of CHRYSYMENIA ROSEA, var. ORCADENSIS :—*the natural size*.
2. A young frond :—*slightly enlarged*. 3. An older frond :—*the same*.
4. Transverse section of the frond :—*highly magnified*.

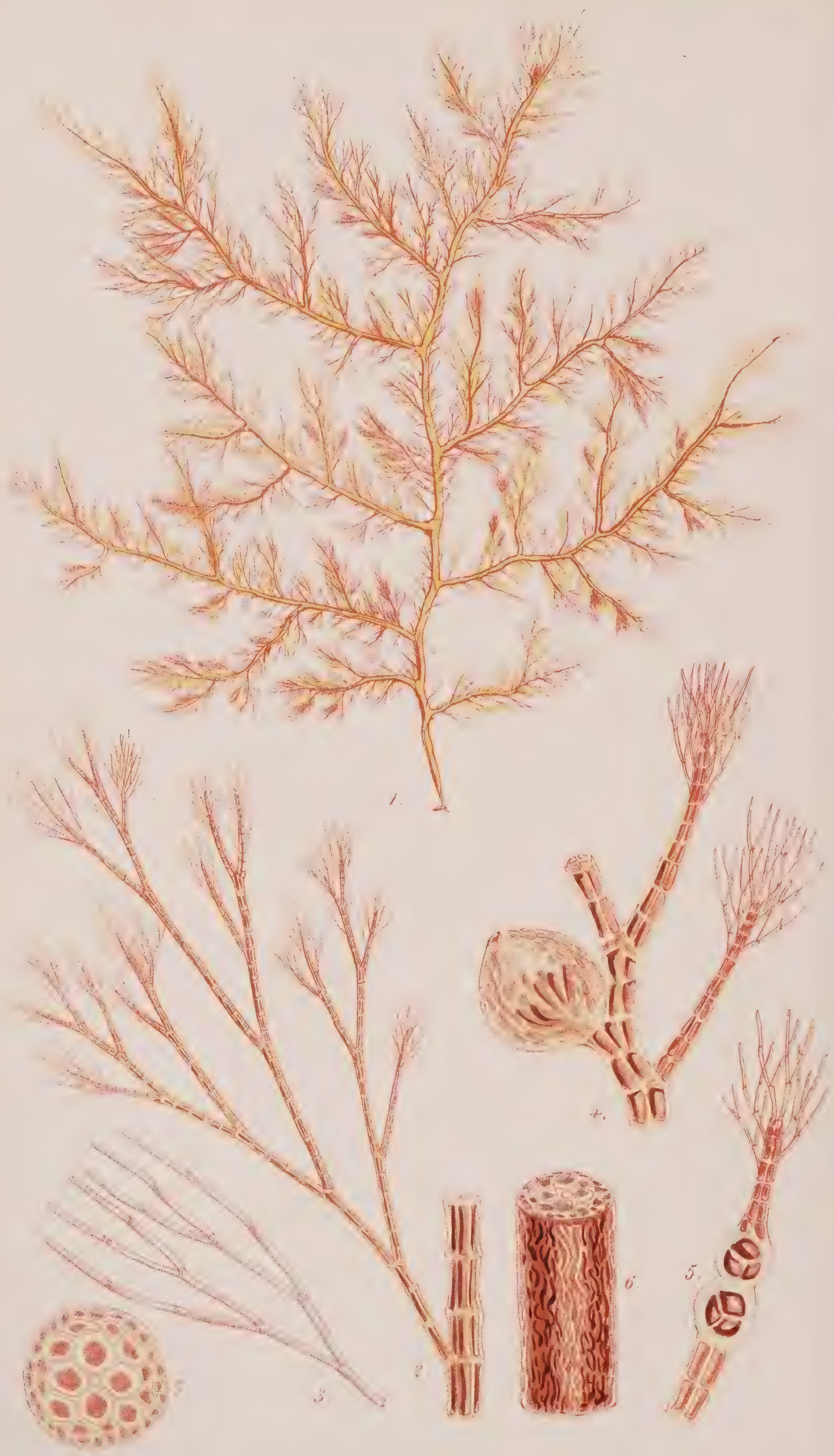


PLATE CCCII.

POLYSIPHONIA FIBRILLOSA, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; articulations longitudinally striate, composed of numerous, radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores*, imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—*πολυς*, *many*, and *σιφων*, *a tube*.

POLYSIPHONIA *fibrillosa*; pale straw-colour or brownish; stems inarticulate, opaque, with sinuous veins, robust, alternately branched; branches spreading, resembling the stem, but less opaque, articulated towards the apices, subsimple, thickly set with very slender, articulated, finely divided, short ramuli, whose tips are copiously fibriliferous; articulations of the ramuli rather longer than broad, 2–3-striate; siphons four, in the stem surrounded by a thick wall of small cells; capsules broadly ovate; tetraspores large, in distorted terminal ramuli.

POLYSIPHONIA *fibrillosa*, *Grev.*—*Harv. in Hook. Br. Fl.* vol. ii. p. 334. *Harv. Man.* ed. 2. p. 87. *Wyatt, Alg. Danm.* no. 136. *Endl. 3rd Suppl.* p. 46. *J. Ag. Alg. Medit.* p. 138. *Kütz. Sp. Alg.* p. 827. *Kütz. Phyc. Gen.* p. 427.

HUTCHINSIA *fibrillosa*, *Ag. Sp. Alg.* vol. ii. p. 78. *Lyngb. Hyd. Dan.* p. 113.

HUTCHINSIA *lubrica*, *Ag. l. c.* p. 94 (*fide J. Ag.*)

HUTCHINSIA *pilosa*, *Nacc. (fide J. Ag.)*

CONFERVA *fibrillosa*, *Dillw. ! Syn.* p. 86. t. G.

HAB. On rocks and stones, and on *Algæ*, chiefly in clear, sunny pools left by the falling tide. Annual. Summer. Frequent on the British coasts.

GEOGR. DISTR. Atlantic shores of Europe. Baltic and Mediterranean Seas.

DESCR. *Root* a small disc. *Fronds* solitary or tufted, not densely aggregated, from six to eight or ten inches in length, often twice the diameter of hog's bristle in the lower part, attenuated upwards; sometimes of half these dimensions or less. *Stem* either undivided, running through the frond, or once or twice parted into a few principal branches, naked for a short way above the base, then furnished with closely-placed lateral branches for the whole remaining length. *Branches* widely spreading or horizontal, robust like the stem, the lowermost longest, the rest gradually shorter, repeatedly and decompoundly branched alternately, each younger set of branches more slender than the rest, till the ultimate divisions are finer than hair. In large and old specimens the series of lesser branches are sometimes as many

as six or eight, when the plant becomes exceedingly feathery and delicate. *Stem* and branches opaque, without visible articulations, coated with sinuous, narrow veins; lesser branches toward the upper part gradually more clearly jointed, with swollen joints, the articulations once and a half to twice as long as broad; small branches and ramuli all pellucidly articulate, two-tubed, with short joints; their tips copiously clothed with dichotomous fibrils. A cross section of the stem shows four large tubes, surrounding a minute cavity and clothed externally with a broad stratum of cells; all coloured. *Capsules* ovate, scattered over the lesser branches and generally sessile. *Tetraspores* large, imbedded in the ramuli. *Colour*, when growing (as the plant often does) in sunny pools, a pale straw-yellow; when developed in darker places, more or less deeply brown: in drying it becomes always darker and usually of a rich reddish-brown. *Substance* cartilaginous in the stem, very soft and gelatino-membranaceous in the ramuli. It closely adheres to paper in drying, and soon decomposes in fresh water or the air.

A common plant, subject to many variations in form, but generally recognized by its somewhat clumsy, unjointed stems, and short, soft, and gelatinous ramuli copiously fibrillose at the tips. It is most nearly related to *P. violacea*, with which alone can it well be confounded, and from which it chiefly differs in its shorter and less multifid ramuli, duller colour, and shorter articulations; but there are specimens occasionally found which seem almost to connect these two species together.

I have not enumerated the continental *P. allochroa* among the synonyms, not having examined an authentically named specimen of that species; but what I have received from several correspondents under that name does not appear to me to differ essentially from *P. fibrillosa* of British authors.

Fig. 1. POLYSIPHONIA FIBRILLOSA:—*the natural size*. 2. A small branch. 3. Fibril from one of the tips of the same. 4. Branchlets with a capsule. 5. Branchlet with tetraspores. 6. Portion of the lower part of the stem. 7. Transverse section of the same.



PLATE CCCIII.

POLYSIPHONIA AFFINIS, *Moore*.

GEN. CHAR. *Fronde* filamentous, partially or generally articulate; articulations longitudinally striate, composed of numerous, radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate capsules (*ceramidia*) furnished with a terminal pore and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from *πολυς*, many, and *σιφων*, a tube.

POLYSIPHONIA *affinis*; filaments robust, elongated, cartilaginous below, flaccid above, irregularly divided; branches patent, naked at base, multifid and with an ovate outline above; ramuli very erect, simple or divided, acute; articulations multistriate, the lower two or three times longer, the upper as long as broad; siphons about sixteen; *ceramidia* ovate, stalked or sessile.

POLYSIPHONIA *affinis*, *Moore in Ord. Surv. Londonderry, Appendix*, p. 11. t. 7. *Harv. Man.* ed. 2. p. 90.

HAB. On rocks, &c., in the sea, thrown up from deep water. Carnlough, near Glenarm, *Dr. Drummond*. Cushendall, *Mr. Moore*. (*W.H.H.*, 1850.)

GEOGR. DISTR. — ?

DESCR. *Root* a small disc. *Fronde*s as thick as hog's bristle at base, attenuated upwards, six or eight inches long or more, divided irregularly, or subdichotomously into a few principal branches, or alternately branched; branches long, spreading, bare of ramuli in the lowest part, more or less copiously furnished with short branches above; these lesser branches are one or two inches long, with a broadly ovate outline, naked below, multifid above, the lesser divisions repeatedly pinnate, all the divisions alternate. The tendency to branch only at the upper portion of each rachis is equally characteristic of the ultimate divisions as of the primary and secondary. *Articulations* of the stem and branches twice or thrice as long as broad; of the ramuli shorter, with pellucid dissepiments; siphons about sixteen. *Capsules* ovate or subglobose, on short stalks or sessile. *Tetraspores* large, in the ultimate ramuli, which are then distorted. *Colour* varying from a pale to a dark reddish-brown. *Substance* of the stem cartilaginous, of the upper portion flaccid, and closely adhering to paper.

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Very closely related to *P. nigrescens*, from which it chiefly



differs in the greater length of the articulations of the stem, rather a variable character; and in the smaller number of siphons in each whorl. The ramification is somewhat more lax; the spaces of naked branch at the bases of the branching portion are longer; the filaments are more flexuous and flaccid, and the colour is usually paler than in *P. nigrescens*, but there is such a general similarity that I could be well contented to regard it as a deep-water form of that species. I have endeavoured, in the accompanying plate drawn from one of Mr. Moore's original specimens, to show all the characters proper to the species. *P. affinis* was first observed, some twenty years ago, on the coast of Antrim by Dr. Drummond of Belfast, and was soon afterwards found, in considerable plenty on the same coast, at a station a few miles distant by Mr. Moore, and was by the latter gentleman described and figured in the Survey Report of Londonderry. In the present year (1850) I collected a few specimens in Mr. Moore's locality.

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Fig. 1. POLYSIPHONIA AFFINIS:—*the natural size.* 2. Small branch, with capsules. 3. Portion of the same. 4. A ramulus with imbedded tetraspores. 5. Articulations of the stem. 5. Transverse section of the stem:—*all magnified.*

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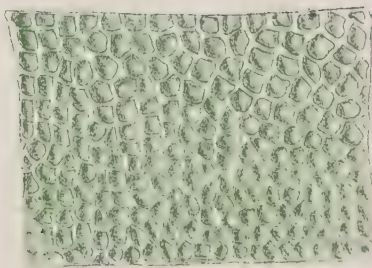
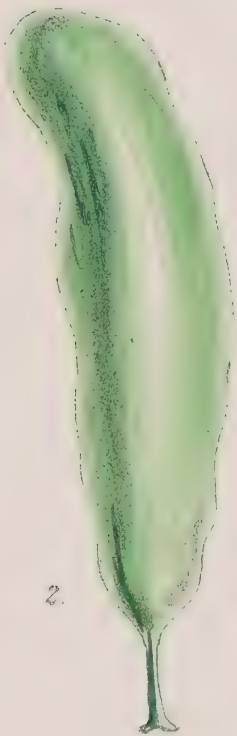


PLATE CCCIV.

ENTEROMORPHA CORNUCOPIÆ, *Hook.*

GEN. CHAR. *Fron*d tubular, membranaceous, of a green colour, and reticulated structure. *Fructification*, granules, commonly in fours, contained in the cellules of the frond. ENTEROMORPHA (*Link*),—from *εντερον*, an *ent*rail, and *μορφη*, *form* or *appearance*.

ENTEROMORPHA *Cornucopiæ*; gregarious, small; fronds stipitate, tubular at the base, suddenly dilated, widening upwards, plaited and lacinate at the margin.

ENTEROMORPHA *Cornucopiæ*, *Hook. Br. Fl.* vol. ii. p. 313. *Harv. Man.* ed. 2. p. 213.

SCYTOSIPHON *intestinalis*, γ. *cornucopiæ*, *Lyngb. Hyd. Dan.* p. 67.

SOLENTIA *intestinalis*, γ. *cornucopiæ*, *Ag. Syst.* p. 185.

ULVA *intestinalis*, γ. *cornucopiæ*, *Ag. Sp. Alg.* vol. i. p. 419. *Wahl. Fl. Lapp.* p. 505. *Kütz. Sp. Alg.* p. 478.

HAB. On corallines, &c., in rocky pools left by the tide. Annual. Spring and Summer. Appin, *Capt. Carmichael*. Marwick, Orkney, *Messrs. Thomas and M'Bain*.

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Root* a minute, scutate disc. *Fron*ds from an inch to an inch and a half in height, with a distinct filiform stem, about a line in length, at the summit of which the tube suddenly enlarges and becomes saccate, and then gradually increases in diameter upwards. When young the frond is a closed sac; at a later period the apex bursts, the frond then becomes funnel-shaped, and jagged and plaited at the margin. *Substance* delicately membranaceous. *Structure* cellular; the cells quadrate, something larger than in *E. intestinalis*. *Colour* a pleasant grass-green.

Had not this plant been admitted to the rank of a species by the late Capt. Carmichael, than whom few naturalists have more carefully studied this variable genus, I should have been contented to regard it, with continental authors, as a dwarf variety of *E. intestinalis*. Capt. Carmichael says, “Without pushing the system of varieties to an extravagant length, this plant cannot be considered as a variety of *E. intestinalis*; the characters of the definition mark it as abundantly distinct, and to these characters it is universally constant. I look upon it,



indeed, as a much more distinct species than *E. compressa*, specimens of which occur, now and then, very difficult to be distinguished from *E. intestinalis*."—*Carm. in Hook. Br. Fl.* vol. ii. p. 313.

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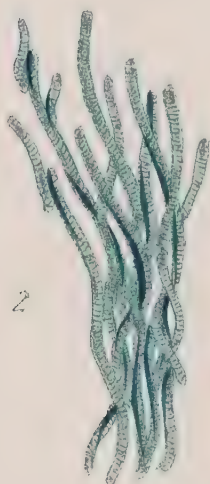
Fig. 1. ENTEROMORPHA CORNUCOPIÆ, fronds of various ages, growing on *Laurencia pinnatifida*:—*the natural size*. 2. A young, and 3, an old frond:—*slightly enlarged*. 4. Small portion of the membrane:—*highly magnified*.

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1.



2.



3.



4.



## PLATE CCCV.

CALOTHRIX CÆSPITULA, *Harv.*

GEN. CHAR. *Filaments* destitute of a mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolved into lenticular sporidia. CALOTHRIX (*Ag.*),—from *καλος*, *beautiful*, and *θριξ*, a *hair*.

CALOTHRIX *cæspitula*; filaments forming close, convex, blackish-green tufts, densely packed, flexuous, flaccid, obtuse, not attenuated, here and there spuriously branched: border of the filaments narrow.

CALOTHRIX *cæspitula*, *Harv. in Hook. Br. Fl.* vol. ii. p. 369. *Harv. in Mack. Fl. Hib.* part 3. p. 237. *Harv. Man.* ed. 2. p. 225.

LEIBLEINIA *cæspitula*, *Kg. Sp. Alg.* p. 278.

HAB. Marine rocks, near high-water mark. Annual? Summer. Miltown Malbay, 1831. (*W.H.H.*)

GEOGR. DISTR. —? Adriatic (*Kützting*).

DESCR. *Tufts* very convex, from a quarter inch to an inch and a half in diameter, hemispherical or irregular in outline, deep blackish-green, flaccid, yielding to the touch, growing either on the naked rock or on corallines, shells, &c. *Filaments* densely packed together, often twisted round each other in small bundles, either simple or appositionally branched, obtuse, cylindrical, not tapering to either end; branches erect. *Endochrome* dense, filling the tube; the striæ dense and strongly marked; border narrow.

I can say but little respecting this species, although I am responsible for having originally given it a name. The specimens gathered by me in 1831,—from one of which, assisted by a sketch made at the time from the fresh plant, the plate now given has been prepared,—were collected in rock pools of salt water into which the sea only flows at spring tides, situated at the extremity of “Spanish Point,” Miltown Malbay. I have repeatedly sought for the plant on subsequent visits to the west coast, but never successfully, nor have I received specimens from any correspondent. The only continental author who has

noticed this plant is Kützing, who describes what he regards as the same from the shores of the Adriatic, but it would be satisfactory to have specimens from each locality compared together before deciding on their identity.

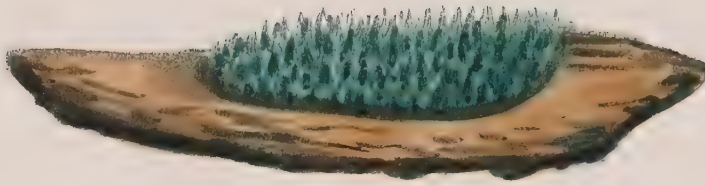
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Fig. 1. Tufts of *CALOTHRIX CÆSPITULA*, growing on a piece of rock:—*the natural size*. 2. Portion of the tuft. 3. Part of the same, more separated:—*both magnified*. 4. Filaments:—*more highly magnified*.

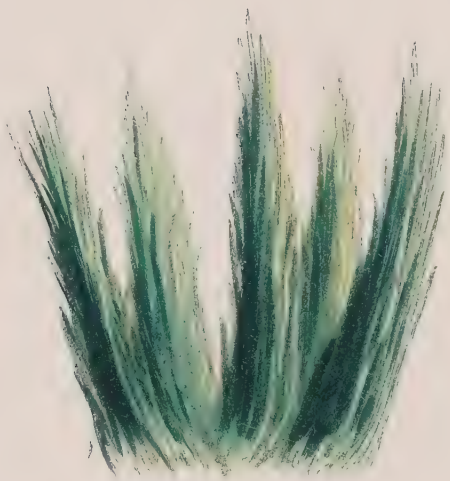
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1.



2.



3.



4.

## PLATE CCCVI.

CALOTHRIX HYDNOIDES, *Carm.*

GEN. CHAR. *Filaments* destitute of a mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolved into lenticular sporidia. CALOTHRIX (*Ag.*),—from *καλος*, *beautiful*, and *θρίξ*, a *hair*.

CALOTHRIX *hydroides*; patches widely spreading, flattish, dark olive-green; filaments elongated, flexuous, cylindrical, obtuse, interwoven below, their tips cohering in rigid, erect, tooth-like bundles; border of the filament wide, pellucid.

CALOTHRIX *hydroides*, *Carm. in Hook. Br. Fl.* vol. ii. p. 369. *Harv. Man.* ed. 2. p. 225.

SCYTONEMA *hydroides*, *Carm. Algæ Appinenses*, MSS. cum icone.

SYMPLOCA *hydroides*, *Kg. Sp. Alg.* p. 272.

HAB. On the clayey sea-shore, near high-water mark. Appin, *Capt. Carmichael*. Near Queenstown, Cork Harbour, and various other places, *W. H. H.* Sidmouth, *Rev. R. Cresswell*.

GEOGR. DISTR. Channel coast of France, *M. Lenormand*.

DESCR. *Patches* spreading over the mud, covering spaces one to two or three or more inches in diameter, sometimes widely spreading, and commonly circular, bristling all over with rigid, erect, close-set but not confounded, tooth-like bundles of filaments, resembling the teeth of a *Hydnum*. *Filaments* composing the patch at first decumbent, spreading over the mud from a common centre, and interwoven together in a thin stratum, their points curved upwards, and strongly glued together in the tooth-like bundles;—each filament with a wide, yellowish, pellucid border, and a dark green endochrome, with subdistant, strongly-marked striæ. The filaments are what is called spuriously branched; that is, small filaments, resembling branches, adhere to the sides of longer ones, as shown in Fig. 4.

A well marked and easily recognized species, first noticed by the late Capt. Carmichael on the muddy sea-shore near Appin. He found it forming small patches an inch or two across, bristling over with small points like the teeth of a *Hydnum*, and this appears to be its usual habit when growing in mud. When

found on rocks the patches are often of much greater extent, spreading over the surface for many feet, when the plant may be compared to pieces of rough, dark-green plush. There is always a peculiarly rigid, harsh feel by which this plant may be distinguished from *C. scopulorum*. From *C. pannosa* it differs in its shorter filaments, and the more tooth-like bundles into which they are aggregated.

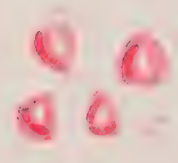
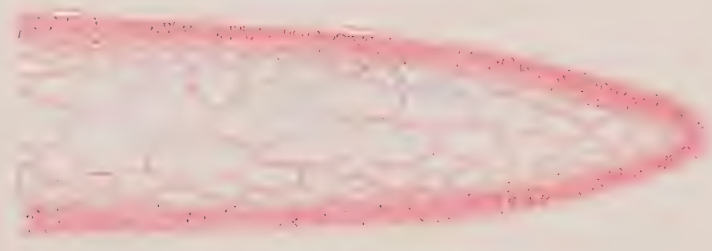
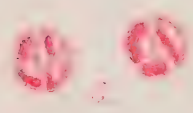
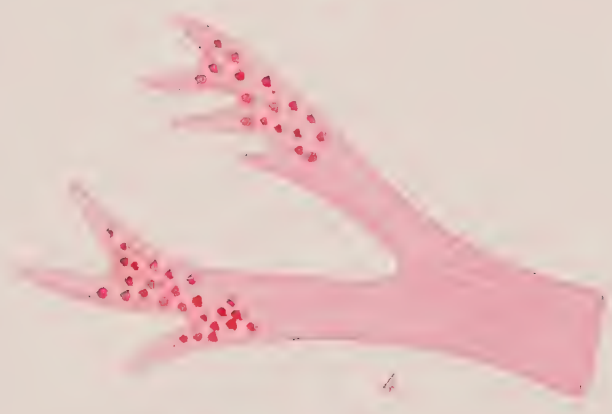
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Fig. 1. Patch of CALOTHRIX HYDNOIDES:—*the natural size*. 2. Tooth-like fascicles, from the same:—*slightly magnified*. 3 and 4. Filaments, and apices of the same:—*more highly magnified*.

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## PLATE CCCVII.

RHODYMENIA CRISTATA, *Grev.*

GEN. CHAR. *Fron*d flat, membranaceous or subcoriaceous, ribless, veinless, cellular; central cells of moderate size, those of the surface minute. *Fructification*: 1, convex *tubercles* (*coccidia*), having a thick, cellular pericarp, and containing a mass of minute *spores*; 2, *tetraspores*, either zoned or tripartite, imbedded among the cells of the surface, scattered, or forming cloudy patches. RHODYMENIA (*Grev.*),—from *ῥοδεος*, *red*, and *ὑμην*, a *membrane*.

RHODYMENIA *cristata*; frond fan-shaped, membranaceous, subdichotomous, the segments dilated upwards, repeatedly subdivided; lesser divisions alternate, linear, laciniate at the ends and often fimbriate at the margin; tubercles spherical, marginal, sessile.

RHODYMENIA *cristata*, *Grev. Alg. Brit.* p. 89. *Hook. Br. Fl.* vol. ii. p. 290. *Harv. Man.* ed. 2. p. 126. *Endl. 3rd. Suppl.* p. 210.

CALLOPHYLLIS *cristata*, *Kütz. Sp. Alg.* p. 747.

SPHÆROCOCCLUS *cristatus*, *Ag. Syn.* p. 29. *Lyngb. Hyd. Dan.* p. 13. t. 4. *Ag. Sp. Alg.* vol. i. p. 300. *Ag. Syst.* p. 231. *Hook. Fl. Scot.* part 2. p. 104. *Grev. Crypt. Scot.* t. 85. *Fl. Edin.* p. 296. *Kütz. Phyc. Gen.* p. 410.

FUCUS *cristatus*, *Herb. Linn. Turn. Hist.* t. 23.

FUCUS *gigartinus*, *Fl. Dan.* t. 394. *Mohr, Hist. Isl.* p. 247. *Gunn. Fl. Norv.* n. 847.

HAB. Growing on the roots and stems of *Laminariæ* in deep water, very rare. Annual. July. Sea-shore at Wick, Caithness, *Messrs. Hooker and Borrer*. Frith of Forth, *Dr. Greville*. Berwick, *Dr. Johnston*. Shetland, at Bressay, in fourteen fathoms, *Prof. E. Forbes*. Several stations in the Orkney Islands, in 8–10 fathoms, *Lieut. Thomas and Dr. M'Bain*.

GEOGR. DISTR. Arctic Sea, and shores of the North of Europe. Iceland. Eastern shores of North America, as far south as Cape Cod.

DESCR. *Root* minute, discoid. *Fron*ds in British specimens from half an inch to an inch, rarely two inches long, in American from two to four or five inches, from one to three or four lines in breadth, fan-shaped or semicircular in outline, sometimes quite fastigiate, sometimes irregularly divided, some of the branches far out-topping the others, excessively branched from the base. *Branches* linear, or slightly broader upwards, subdichotomous, but very irregular in division; sometimes alternately divided, sometimes secund, and sometimes fingered, or branched in a manner compounded of all these. The lesser divisions are usually bordered with slender, jagged



segments, often beautifully fringed; and the truncate tips finely cut. *Tubercles* abundant, as large as poppy-seed, scattered along the margin of the frond, both of the smaller and larger divisions. *Tetraspores* crowded in the ultimate ramuli, on plants more slenderly branched than those that bear tubercles. *Colour* a brilliant crimson-lake, becoming brighter in fresh water, and at length discharged on long steeping. *Substance* membranaceous, soft, adhering to paper in drying.

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One of the rarest of the British Algæ, almost confined with us to the northern shores of Scotland, and the Orkney and Shetland Islands, and in no place found in abundance. In general British specimens are small, rarely attaining the size of that represented in our plate, which is copied from the largest of those presented to us by Messrs. Thomas and Mac Bain. Most others which we possess are less than an inch in length; some having deeply-cut fronds, like our Fig. 2, and others comparatively little divided, like Fig. 3. All are, however, but pygmies to the specimens collected on the east coast of America, where this plant is as common as *Plocamium coccineum* is with us, and to be found as invariably ornamenting the *sea-weed pictures* made by fair Bostonians as the latter is in those manufactured at this side the Atlantic. On the American coast *R. cristata* commences in the Arctic Sea, and extends southward to Cape Cod (lat.  $42^{\circ}$ ) where it suddenly disappears, as do also several other northern species of marine plants and animals. In Boston Bay it is peculiarly plentiful and of large size, and sports in a number of varieties, some of which so closely resemble the narrower and more delicate specimens of *Sphærococcus coronopifolius*, that it requires a practised eye to distinguish them without an appeal to the dissecting knife.

The most southern point in Europe at which this plant has been found is Berwick Bay (lat.  $55^{\circ}45'$ ), and there I believe it has been taken but once. This affords a remarkable contrast to its southern limit in America.

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Fig. 1. RHODYMENIA CRISTATA:—*natural size*. 2. A small frond, *somewhat magnified*. 3. Another, of a broader variety. 4. Apices of laciniae with imbedded tetraspores. 5. Tetraspores. 6. Section of a coccidium. 7. Spores. 8. Thin slice, to show internal structure of the frond:—*all magnified*.

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## PLATE CCCVIII.

CALLITHAMNION FASCICULATUM, *Harv.*

GEN. CHAR. *Fronde* rosy or brownish-red, filamentous; stem either opaque and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants: 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like *receptacles* (*favellæ*), seated on the main branches, and containing numerous, angular spores. CALLITHAMNION (*Ag.*),—from *καλλος*, *beauty*, and *θαμνιον*, *a little shrub*.

CALLITHAMNION *fasciculatum*; tufted; branches erect, flexuous, level-topped; plumules elongate, erect, linear-obovate, truncate; pinnæ long and flexuous, the lowermost simple, appressed, the upper erecto-patent, branching toward the tip; articulations of the branches veiny, thrice as long as broad, of the pinnæ once or twice as long as broad, with contracted dissepiments.

CALLITHAMNION *fasciculatum*, *Harv. in Hook. Br. Fl.* vol. ii. p. 343. *Harv. Man.* ed. 2. p. 179. *Kütz. Sp. Alg.* p. 652.

HAB. At Yarmouth, *Mr. Borrer*, in *Herb. Hooker*.

GEOGR. DISTR. — ?

DESCR. *Fronde* from two to three inches high, nearly bare of branches below, much branched and tufted upwards, bushy, capillary; the apices of the branches looking, to the naked eye, as if truncated or corymbose. *Branches* long and flexuous, very erect, their upper half closely plumulate. *Plumules* long and narrow, with a linear-obovate or spatulate outline, erect, the lowermost pinnæ quite simple, moniliform, with contracted joints and acute terminal cells; the uppermost gradually longer and more spreading, branching at the apex. *Articulations* of the branches veiny, from three to four times as long as broad; of the lesser branches (or rachides of the plumules) about twice as long as broad; of the pinnules oval, twice as long as broad, with very contracted dissepiments. *Tetraspores* elliptical, mostly solitary, toward the base of a pinnule. *Colour* a fine purple-red. *Substance* membranaceous, adhering to paper.

I have deferred figuring *Cal. fasciculatum* of the Brit. Flora to this late period, in the hope, disappointed hitherto, that some

fortunate collector would find it again, and thus establish a species which at present rests upon a single specimen preserved in the herbarium of Sir W. J. Hooker, and collected early in the present century. The figure now given exhibits all the characters of the species, faithfully copied from a small fragment of the Hookerian specimen. It will be seen that the habit, to the naked eye, is that of *C. corymbosum*, while the microscopic characters are nearer those of *C. Borreri*, than those of any other species. On comparing our present figure with our TAB. CLIX. differences so important will be seen between the two plants as to forbid their being confounded together, and thus we are compelled to retain *C. fasciculatum*, although it rests on such unsatisfactory evidence as a solitary specimen. The diameter of the filament is greater than that of the usual state of *C. Borreri*, and much greater than that of *C. roseum*, and the constricted dissepiments of the ramuli are very characteristic. It will be seen by Fig. 6, that the stems are those of a "*Phlebothamnion*," Kützing.

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Fig. 1. CALLITHAMNION FASCICULATUM:—*the natural size*. 2. A plumule or pinnated branchlet from the same. 3. One of the lowermost pinnæ. 4. One of the upper pinnæ. 5. Pinnæ with a tetraspore. 6. Small portion of one of the main branches:—*all more or less magnified*.

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## PLATE CCCIX.

CALOTHRIX SEMIPLENA, *Ag.*

GEN. CHAR. *Filaments* destitute of a mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolved into lenticular sporidia. CALOTHRIX (*Ag.*),—from *καλος*, *beautiful*, and *τριξ*, *a hair*.

CALOTHRIX *semiplena*; filaments long, slender, tough, flexuous, densely interwoven into lamellated tufts; endochrome glaucous green, frequently interrupted, leaving parts of the tube empty.

CALOTHRIX *semiplena*, *Ag. Bot. Zeit.* 1827, No. 40.

CALOTHRIX *lamellata*, *Harv. in Herb.* 1844! (*excl. spec. from Roundstone*).

LYNGBYA *semiplena*, *J. Ag. Alg. Medit.* p. 11.

LYNGBYA *lutescens*, *Lieb. (fide Kütz.)*

LEIBLEINIA *semiplena*, *Kütz. Phyc. Gen.* p. 221. *Sp. Alg.* p. 278.

HAB. In rock-pools near high-water mark, growing on *Corallina officinalis* and other small algæ. Kilkee, *W. H. H.* Sidmouth, *Rev. R. Cresswell*.

GEOGR. DISTR. The Mediterranean and Adriatic Seas, *Agardh*. Shores of Norway, *Areschoug*! (*Alg. Scand.* No. 8! growing with *Callithamnion Rothii*). Cherbourg, *Lenormand* (as *C. pulvinata*? *Ag.*)

DESCR. *Filaments* from half an inch to an inch or more in length, very slender, simple, waved and gently curved, but not curling, cohering firmly together in flattened bundles or tufts, which often expand laterally into laminæ, which are broad below, and gradually narrowed upwards, standing erect, and frequently pointed. These laminæ are sometimes loosely bundled together; at other times they are closely heaped, one on the other. The endochrome is dense, of a glaucous or verdegris green colour, and is frequently interrupted, leaving long spaces of colourless tube between each frustum of endochrome. The apices of the filaments are blunt. *Substance* membranaceous, but tough, adhering to paper in drying.

I have to apologize to the readers of the 'Phycologia' for having, under Pl. LXXVI. (*Calothrix pannosa*), confounded the plant now figured with a very different species. The confusion is, however, fortunately limited to the remarks under the description, and to the habitats given;—for the figure, and the whole

description, belong to *C. pannosa*, or at least to the Roundstone plant so named. I am indebted to my friend Mr. Thwaites, for suggesting that our plant (*C. lamellata*, MS.) might be the *C. semiplena* of Agardh, and, though I have seen no authentic specimen, I have little doubt that this is so. At least, the specimen in my copy of Areschoug's 'Algæ Scandinavicæ,' which is quoted by Kützing under his *Leibleinia semiplena*, seems identical with our Irish specimens here figured, but is less luxuriant. The species would appear to have a wide range, both in the warmer and colder seas of Europe. Specimens from Cherbourg, communicated by *M. Lenormand*, doubtfully marked *C. pulvinata*? Ag., are very similar to those from the opposite shores of England.

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Fig. 1. CALOTHRIX SEMIPLANA, a mass of laminated tufts:—*the natural size*.  
2. Filaments from the same:—*magnified*. 3. Portions of filaments:—*more highly magnified*.

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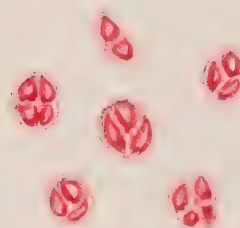


PLATE CCCX.

PHYLLOPHORA PALMETTOIDES, *J. Ag.*

GEN. CHAR. *Fronde* stipitate, rigid, membranaceous, proliferous, nerveless, or with a vanishing nerve, cellular; cells minute, angular, gradually smaller towards the surface. *Fructification*, 1, *tubercles* (*favellidia*?) scattered over the frond containing masses of minute spores; 2, *warts* (*nemathecia*) seated on the frond, composed of radiating, moniliform filaments, whose lower articulations are at length changed into spores; 3, *tetraspores*, collected into sori, either towards the apex of the frond or in proper leaflets. PHYLLOPHORA (*Grev.*),—from *φυλλον*, a *leaf*, and *φορεω*, to *bear*.

PHYLLOPHORA *Palmettoides*; root a widely-expanded disc; stem cylindrical, filiform, simple or branched, expanding into an oblong, narrow-obovate or cuneate, simple or once-forked, rose-coloured frond, which is sometimes proliferous; sorus of tetraspores solitary, transverse, elliptical; near the apex of the frond, immersed in its substance.

PHYLLOPHORA *Palmettoides*, *J. Ag. in litt.* *Harv. Man.* ed. 2. p. 144.

PHYLLOPHORA *Brodiaei*,  $\beta$ . simplex, *Harv. Phyc. Br.* t. xx. f. 2, 3, 4.

CHONDRUS *Brodiaei*,  $\beta$ . simplex, *Grev. Alg. Brit.* p. 133. *Hook. Br. Fl.* vol. ii. p. 303. *Harv. Man.* ed. 1. p. 78. *Wyatt, Alg. Danm.* no. 121.

FUCUS *membranifolius*, *var. roseus*, *Turn. Hist.* t. 72. f. m.

HAB. On rocks near low-water mark. Perennial. Winter and spring. Rare. Sidmouth and Torquay, *Mrs. Griffiths* and *Miss Cutler*. Plymouth and Whitsand Bay, *Rev. W. S. Hore*.

GEOGR. DISTR. South coast of England. Mediterranean Sea.

DESCR. *Root* a widely-spreading, fleshy disc, an inch or more in diameter. *Fronde*s numerous from the same disc, growing in a scattered manner, two to three or four inches in length, rising with a filiform stem to the height of an inch or an inch and a half; stem then compressed and ending in a cuneate or narrow-obovate, obtuse, simple or forked lamina; sometimes the frond is deeply forked, sometimes only emarginate; the segments frequently proliferous from the apex, or contracted in the middle, and again enlarged. When the tips are injured, the torn edge often bears numerous leaflets irregularly. *Tubercles* I have not seen. *Tetraspores* forming dense, immersed, transverse, oval sori in the centre of the lamina, very minute. *Colour* a bright rosy red. *Substance* membranous, but rather rigid, not adhering to paper, except after long soaking.

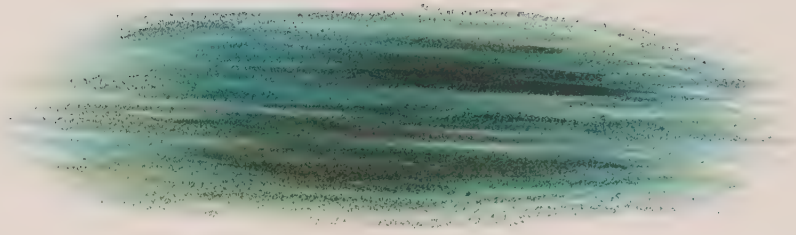


An imperfect representation of this plant has already been given in our first volume (Tab. XX. Fig. 2, 3, 4,) where it was regarded as a variety of *Phyllophora Brodiaei*, according to the views of most British botanists. In the last edition of the 'Manual' I have recognized its specific existence under the name here given, a name adopted from Prof. J. Agardh, who, in a recent letter, points out particularly the characters which distinguish this little plant from the original *P. Brodiaei*. These characters are,—the position of the sorus of tetraspores; the brighter colour of the frond; and the much more widely expanded root. To these I would add a marked difference in its geographical distribution; for while *P. Brodiaei* is confined to our northern shores, *P. palmettoides* is a native, in this country, only of the south of England, and, on the continent, is found in the Mediterranean.

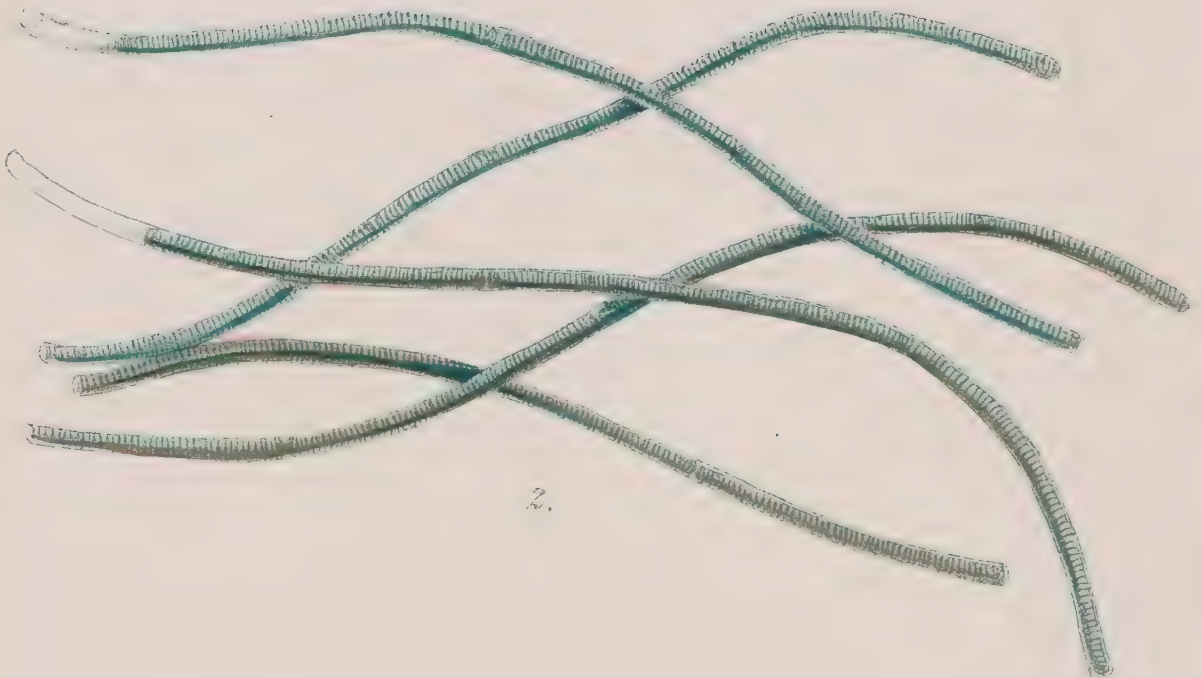
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Fig. 1. Fronds of PHYLLOPHORA PALMETTOIDES :—*the natural size*. 2. Frondlet with a *sorus* in the centre :—*slightly enlarged*. 3. Tetraspores, from the same. 4. Thin slice of the frond, to show structure :—*both highly magnified*.

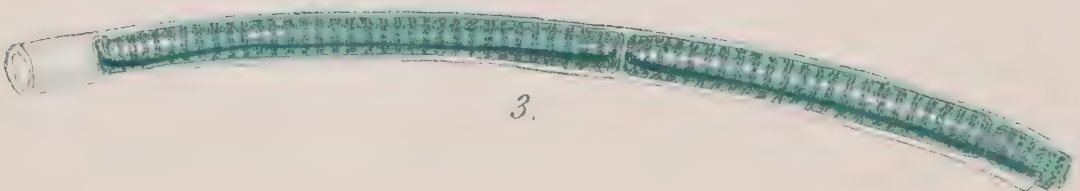




1.



2.



3.



## PLATE CCCXI.

LYNGBYA FERRUGINEA, *Ag.*

GEN. CHAR. *Filaments* destitute of a mucous layer, free, flexible, elongated, decumbent, not oscillating. *Tube* continuous; endochrome green or purple, densely annulated, and finally separating into lenticular sporidia. LYNGBYA (*Ag.*),—in honour of *Hans Christian Lyngbye*, author of an excellent work on the Algæ of Denmark.

LYNGBYA *ferruginea*; filaments slender, flaccid, forming a long stratum of a verdegris-green colour, which gradually changes to a pale chestnut.

LYNGBYA *ferruginea*, *Ag. Syst. Alg.* p. 73. *Harv. in Hook. Brit. Fl.* vol. ii. p. 226. *Harv. Man.* ed. 2. p. 226.

LYNGBYA *æruginosa*, *Ag. Syst.* p. 74. *Kg. Sp. Alg.* p. 282.

LYNGBYA *subsalsa*, *Carm. MSS.*

SCYTONEMA *effusum*, *Carm. MS. (ante).*

HAB. In small, mud-bottomed pools of brackish water, by the sea-side, filled at spring tides. Appin, *Capt. Carmichael*.

GEOGR. DISTR. Similar situations in the North of Europe.

DESCR. *Stratum* "exceedingly thin and lax, extensive, at first of a vivid green colour, but passing gradually into a pale chestnut," *Carm.* *Filaments* an inch long, flaccid, bent in various curves, but not twisted, of a pale verdegris-colour under the microscope. *Endochrome* filling the tube, evidently striate, the striæ rather distant; border narrow. *Colour* of the mass when dry a dull verdegris-green without gloss.

No one appears to have noticed this plant but the late Captain Carmichael, a fact to be regarded more as a proof of the comparatively little attention which has yet been paid to the *Oscillatorieæ*, than evidence of the rarity of this particular species. How few of the collectors of seaweeds trouble themselves with the obscure vegetation of salt-water mud-bottomed pools near the shore:—yet such situations, when attentively examined, are found to be rich in microscopic forms, and in species of this curious family. I have no doubt

but that the present species, which appears to be not uncommon in Northern Europe, may yet be found in many other habitats than the one recorded above.

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Fig. 1. *LYNGBYA FERRUGINEA*; a portion of the stratum, as it appears to the naked eye. 2. Filaments from the same:—*magnified*. 3. Portion of a filament, *highly magnified*.

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## PLATE CCCXII.

DESMARESTIA VIRIDIS, *Lamour*.

GEN. CHAR. *Frond* linear, either filiform, compressed, or flat, distichously branched, cellular, traversed by an internal, single-tubed, articulated filament; producing, when young, marginal tufts of byssoid, branching fibres. *DESMARESTIA* (*Lamour*.),—in honour of *A. G. Desmarest*, a celebrated French naturalist.

*DESMARESTIA viridis*; frond cylindrical, filiform, repeatedly pinnate; pinnæ and pinnulæ capillary, exactly opposite, patent.

*DESMARESTIA viridis*, *Lamour. Ess.* p. 25. *Endl. 3rd Suppl.* p. 28. *Harv. Man.* ed. 2. p. 24. *Kütz. Phyc. Gen.* p. 344. *Kütz. Sp. Alg.* p. 570.

*DICHLORIA viridis*, *Grev. Alg. Brit.* p. 39. t. 6. *Hook. Br. Fl.* vol. ii. p. 274. *Harv. in Mack. Fl. Hib.* part 3. p. 173. *Wyatt, Alg. Danm.* No. 56. *J. Ag. Sp. Alg.* vol. i. p. 164.

*SPOROCHNUS viridis*, *Ag. Sp. Alg.* vol. i. p. 154. *Ag. Syst.* p. 259. *Grev. Fl. Edin.* p. 287.

*CHORDARIA viridis*, *Ag. Syn.* p. 14. *Hook. Fl. Scot.* part 2. p. 98.

*GIGARTINA viridis*, *Lyngb. Hyd. Dan.* p. 44.

*FUCUS viridis*, *Fl. Dan.* t. 886. *Esper, Ic. Fuc.* t. 114. *Stack. Ner. Brit.* t. 17. *Turn. Syn.* vol. ii. p. 397. *Turn. Hist.* t. 97. *E. Bot.* t. 1669.

HAB. In the sea, growing on stones and the larger algæ between tide-marks, and below low-water mark. Annual. Spring and early summer. Not uncommon.

GEOGR. DISTR. Atlantic shores of Europe and America. Northern Pacific, and Southern and Antarctic Oceans.

DESCR. *Root* a scutate disc. *Fronds* from two to three feet in length, filiform, from a quarter to half a line in diameter at the base, gradually attenuated upwards to an extreme fineness, excessively branched, having an ovate outline, the lower branches long, the upper gradually shorter. All the branches, and every one of the lesser divisions, down to the most minute ramulus, are exactly opposite and distichous; the larger divisions patent or nearly horizontal, the lesser gradually more erect. In a young state the branches and ramuli terminate in excessively fine, articulated, confervoid filaments, which gradually become coated with cells, and thus opaque; the confervoid filament being then encased, and changed into the axis of the compound frond. *Structure* densely cellular, with large air-cells dispersed through the cellular substance; the axile filament very slender. *Colour*, when growing, a deep brown-olive, or "foxy," quickly becoming verdegris-green when removed from the water. *Substance* soft and flaccid, soon decomposing.

There is no British alga with which this beautiful plant can well be confounded. The extreme delicacy of its capillary ramuli, the constantly exact opposition of all its parts, from the primary branches to the most minute of the decompound ramuli (the last of which are much finer than the most slender hair), and the versatile colour, are all marks which peculiarly belong to *Desmarestia viridis*. Old and weather-beaten fronds, which have lost the more delicate ramuli, have something the aspect of *Dictyosiphon fœniculaceus*, but may at once be distinguished by the opposite branching.

At Fig. 2 I have represented the magnified appearance of one of the growing points of the young frond, showing the gradual coating of the confervoid frame-work (or *skeleton*) of the frond. It will be seen that all the younger portions consist of a simple string of cells, or *articulated filament*, and that in the lower part these cells are coated by a stratum of much smaller cellules. As the growth proceeds these external coats are constantly increased, while the original central *skeleton* may still be traced, through all the branches, and even in the stem, a section of which is seen at Fig. 3.

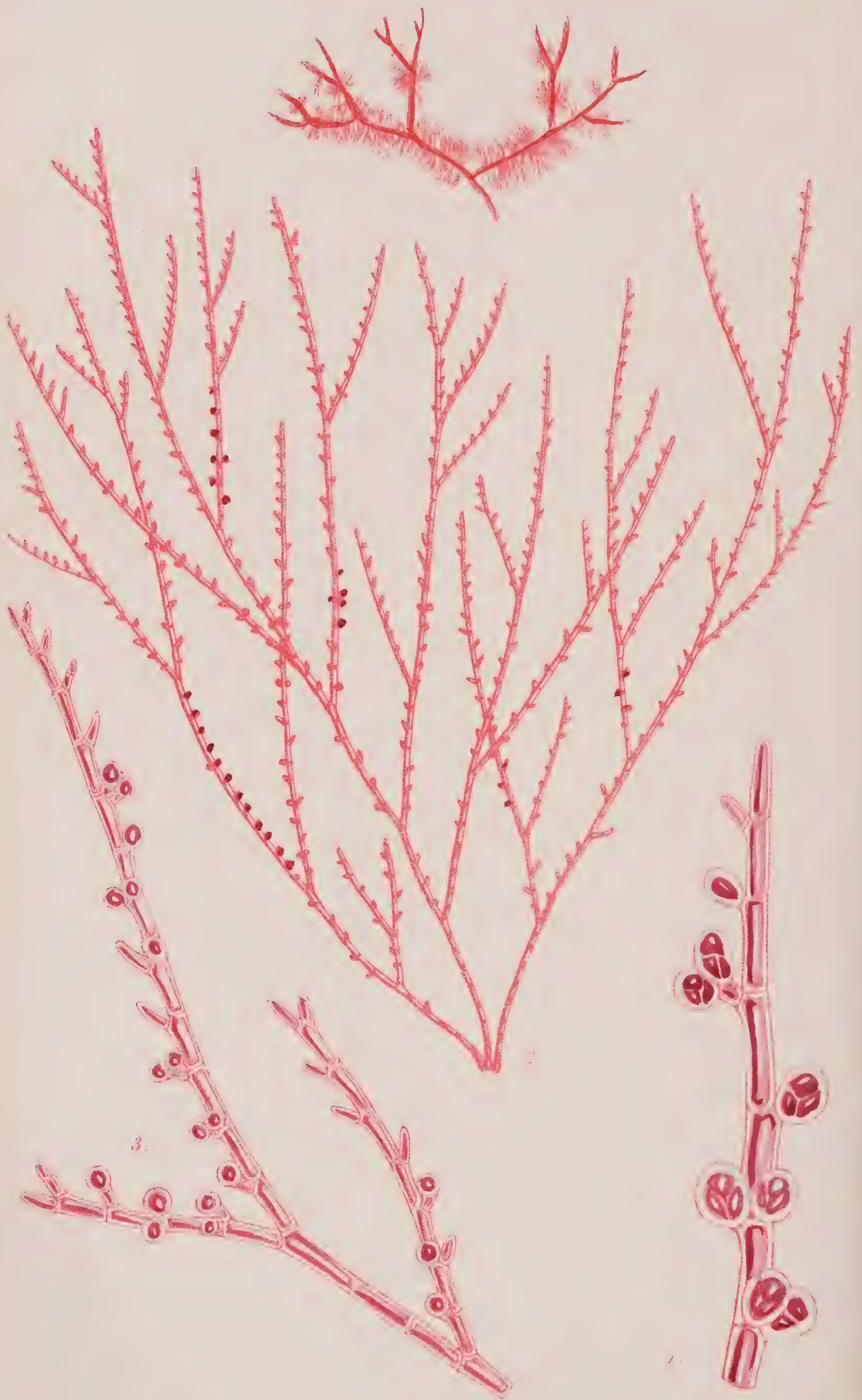
*D. viridis* is very widely dispersed through the colder zones, both north and south, and increases in luxuriance as it approaches either pole.

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Fig. 1. DESMARESTIA VIRIDIS:—*the natural size*. 2. A growing apex of a young branch:—*highly magnified*. 3. A transverse section of the stem:—*magnified*.







## PLATE CCCXIII.

CALLITHAMNION VIRGATULUM, *Harv.*

GEN. CHAR. *Fron*d rosy or brownish-red, filamentous; stem either opaque and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*),—from *καλλος*, *beauty*, and *θαμνιον*, *a little shrub*.

CALLITHAMNION *virgatulum*; rose-red, minute, tufted, much branched; branches long and straight, erecto-patent, alternate or secund; ramuli from every joint, short, obtuse, mostly secund; articulations thrice as long as broad; tetraspores scattered along the branches.

CALLITHAMNION *virgatulum*, *Harv. in Hook. Br. Fl.* vol. ii. p. 349. *Wyatt, Alg. Danm.* No. 189.

CALLITHAMNION *Daviesii*, *var.*, *Harv. Man.* ed. 1. p. 117, ed. 2. p. 184.

HAB. Parasitical on *Ceramium rubrum*, in pools between tide-marks. Torquay, *Mrs. Griffiths*.

GEOGR. DISTR. — ?

DESCR. *Filaments* from two to four lines high, erect, forming little pencil-like tufts, or clothing the stems of the *Ceramium* continuously, in patches 1-2 inches in line, much branched. *Branches* erect, or erecto-patent, long, straight or gently curved, rod-like, with a few scattered similar secondary branches, which are either alternate or secund. *Ramuli* springing from nearly every joint of the primary and secondary branches, mostly secund, sometimes two together, very short, usually consisting of a single cell, obtuse. *Tetraspores* (formed from altered ramuli) scattered plentifully along the branches, secund or two together, either sessile or raised on little stalks. *Colour* a fine, clear, rosy red, preserved in drying. *Substance* membranaceous, delicate. The plant adheres closely to paper.

If we confine our attention to specimens that strictly answer to the characters illustrated in this and the following plate, *C. virgatulum* and *C. Daviesii* appear to be very distinct one from the other, and easily recognized at a glance:—the former



distinguished by the uniform production of short ramuli along all its branches, which thus have the appearance, under the microscope, of budding rods; the latter known by having a few longish ramuli crowded towards the axils of the branches, while the rest of the branch is bare. But I am sorry to say that in practice I find it by no means easy to distinguish these supposed species. It is true that there is no lack of specimens, which are thus clearly distinguishable; but then, on the other hand, there is no lack of intermediate forms, such as bear the names *C. secundatum* and *C. lanuginosum*; *C. luxurians*, J. Ag.; *C. mirabile*, Kütz.; *C. minutissimum*, Suhr.; *C. Lenormandi*, Suhr.; and probably others enumerated by Kützinger. So that once we admit *two* species among these parasites, the door is opened to a dozen. It was for this reason that in the last edition of the Manual I proposed to reduce the four British forms described in 'British Flora' to one, retaining for it the name *Daviesii*. To this decision I have received some earnest protests, particularly from Mrs. Griffiths, and in deference to this "pressure from without" I so far deviate from the line I had prescribed to myself, as to figure the typical *C. virgatulum*; at the same time that I retain my opinion respecting its close affinity—if no more—to *C. Daviesii*.

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Fig. 1. Portion of a frond of *Ceramium rubrum* infested with *CALLITHAMNION VIRGATULUM* :—*the natural size*. 2. Fronds of *Cal. virgatulum* :—*magnified*. 3. Part of a fertile branch. 4. Apex of the same, with tetraspores :—*more or less highly magnified*.

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## PLATE CCCXIV.

CALLITHAMNION DAVIESII, *Lyngb.*

GEN. CHAR. *Fronde* rosy or brownish-red, filamentous; stem either opaque and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous angular *spores*. CALLITHAMNION (*Lyngb.*),—from *καλλος*, *beauty*, and *θαμνιον*, *a little shrub*.

CALLITHAMNION *Daviesii*; rose-red, minute, tufted, much branched; branches curved, scattered, patent; ramuli of several cells, fascicled, or crowded toward the axils of the secondary branches; tetraspores pedicellate, borne on the axillary ramuli.

CALLITHAMNION *Daviesii*, *Lyngb. Hyd. Dan.* p. 129. t. 41. *Ag. Sp. Alg.* vol. ii. p. 186. *Harv. in Hook. Brit. Fl.* vol. ii. p. 348. *Harv. Man.* ed. 1. p. 117. ed. 2. p. 184. (*in part*). *Kütz. Spec. Alg.* p. 638. (*in part*).

TRENTEPOHLIA *Daviesii*, *Harv. in Mack. Fl. Hib.* part 3. p. 219.

CONFERVA *Daviesii*, *Dillw. Conf. t. F. E. Bot.* t. 2329.

HAB. Parasitical on *Ceramium rubrum* and other small Algæ, in pools between tide-marks. Annual. Summer and Autumn. Anglesea, *Rev. H. Davies*. Bantry, *Miss Hutchins*. Torquay, *Mrs. Griffiths*. Brighton, *Mr. Borrer*; and perhaps generally distributed round our shores.

GEOGR. DISTR. Atlantic Shores of Europe. North America.

DESCR. *Filaments* two to four lines high, forming small, pencil-like tufts, or spreading continuously, sometimes but slightly divided, sometimes much branched, the branches in one or two series, curved, spreading. *Primary* branches elongated, destitute of ramuli, but bearing usually, at considerable intervals, two or more rather short, *secondary* branches, which are either alternate or secund, and are furnished near their base, almost at the axil, with several secund closely-placed ramuli. *Ramuli* of several cells, either simple or slightly branched, rarely scattered. *Tetraspores* pedicellate, borne on the supra-axillary ramuli, elliptical. *Colour* a fine rosy red. *Substance* membranaceous and delicate. In drying, the plant adheres closely to paper.

Under the last plate I have stated the close affinity which connects this species with the *Cal. virgatulum*, there figured. Both

are beautiful microscopic objects, but particularly *C. virgatulum*, for I find *C. Daviesii* very generally infested by parasites still more minute than itself, and particularly in and about the axillary ramuli. I do not find it so generally fertile as *C. virgatulum*; the crowding of parasites, and collection of dirt about the ramuli where the tetraspores are borne, probably destroying the fructification.

This little plant bears the name of the late Rev. Hugh Davies, an able botanist of the last generation, whose name will be familiar to the readers of 'English Botany.' He discovered it early in the present century, on the Welsh coast, and it has been found (under one or other of its varieties) in most parts of our shores, on those of Europe, and in America.

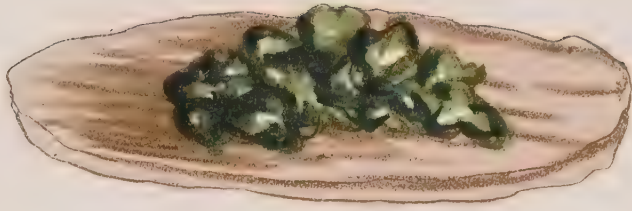
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Fig. 1. Part of a frond of *Ceramium rubrum*, infested with CALLITHAMNION DAVIESII. 3. Fronds of *Callithamnion Daviesii*:—*magnified*. 3. Portion of a branch. 4. Axillary ramuli and tetraspores from the same:—*more or less highly magnified*.

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1.



2.



3.

4.

## PLATE CCCXV.

RIVULARIA PLICATA, *Carm.*

GEN. CHAR. *Frond* globose or lobed, fleshy, firm, composed of continuous, radiating filaments, annulated within and springing from a spherical globule, and surrounded by, or set in, gelatine. RIVULARIA (*Roth*), —in allusion to the fluviatile habitat of some of the species.

RIVULARIA *plicata*; fronds rather large, densely gregarious, gelatinous, compresso-plicate, often hollow and at length ruptured, dark green; filaments wavy, associated in dichotomous series, tapering to a fine point.

RIVULARIA *plicata*, *Carm. Harv. in Hook. Br. Fl.* vol. ii. p. 392. *Harv. Man.* ed. 2. p. 222.

LICHEN *corrugatus*, *Dickson!* (*fide Borrer*).

HAB. On the rocky sea-shore, about high-water mark, or in situations only occasionally overflowed by salt water. Appin, *Capt. Carmichael*. Ballintrae, Ayrshire, *Mr. W. Thompson*. Eyrmouth, *Dr. Johnstone*. Torbay, *Mrs. Griffiths*. Innisчерig Island, Malbay; and elsewhere, *W.H.H.*

GEOGR. DISTR. — ?

DESCR. *Fronds* densely crowded together, each patch generally occupying a surface of several square inches; variously lobed, and by mutual pressure distorted and compressed, so that the mass has a plaited or warted appearance. When young the fronds are solid and firmly gelatinous; as they advance in age they become hollow, and are at length often ruptured and variously torn. *Filaments* wavy and much attenuated, associated in dichotomous or subdichotomous series, each filament being joined to its fellow by a spherical, pellucid connecting cell, and the whole firmly set in the gelatinous matrix of the frond. *Rings* evident and close. *Colour* a dark, lurid, or blackish green. *Substance* elastic, smooth, and somewhat lubricous. In drying, the plant shrinks considerably, and if subjected to pressure will adhere firmly to paper.

A well-marked species of *Rivularia*, easily recognized and not uncommon on several parts of our shores. It was first noticed by the late Captain Carmichael on the west coast of Scotland. Like *R. nitida*, it becomes hollow in age, but may always be known from that species by its much darker and duller colour, smaller size, and the difference of habitat. The fronds are very irregular in shape, and alter considerably as they advance to

maturity, by the lateral pressure of one frond on another. I cannot say anything to the collector of specimens in praise of the beauty of this production ; what it has in that way it keeps concealed, or reserves for microscopic eyes.

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Fig. 1. Cluster of fronds of RIVULARIA PLICATA, on a piece of rock :—*the natural size.* 2. One of the fronds, cut vertically to show the hollow centre. 3. A vertical portion of the gelatine, with imbedded filaments. 4. Some of the filaments removed and pressed asunder :—*the latter figures more or less highly magnified.*

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## PLATE CCCXVI.

SCHIZOSIPHON WARRENIÆ, *Casp.*

GEN. CHAR. *Frond* globose or lobed, gelatinous, composed of closely-packed, annulated, radiating, sheathed filaments, each of which springs from a pellucid cell. *Sheath* gelatino-membranous, vertically cleft into innumerable hair-like shreds. SCHIZOSIPHON (*Kütz.*),—from *σχίζω*, to divide, and *σιφών*, a tube.

SCHIZOTHRIX *Warreniæ*; “fastigiately branched; the lowest cell of the branches wider, hemispherical, lateral; sheaths dark-coloured, the fibres often spiral; apices of the branches much attenuated.” *Casp.*

SCHIZOSIPHON *Warreniæ*, *Caspary in Ann. and Mag. Nat. Hist.* 3rd series, vol. vi. p. 266. t. 8.

HAB. On rocks at high-water mark, chiefly in places exposed to the dripping of fresh water. Near Mainporth, Falmouth, and at Plymouth, *Dr. Robert Caspary*. Sidmouth, *Rev. R. Cresswell*.

GEOGR. DISTR. — ?

DESCR. “The plant forms a solid crust over the horizontal rock, to the extent of many square feet, in larger or smaller patches, from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch in thickness, throwing up on the surface little spherical elevations of different diameter and height.” “The colour is, in the fresh state, a dark, dull, blackish-green; in the decayed, a tan-brown, and on the rocks the greater part of the plant is of the latter colour. It feels slimy and slippery.” “The stem and branches are, with the exception of the apices, enveloped in a sheath of brownish-green jelly. This sheath is composed of many funnel-shaped, gelatinous tubes, succeeding each other at little distances; the upper part with its thinner end in the wider of the lower, and surrounding the stem in such a way that this seems to be covered with a solid gelatinous mass. The upper end of each tube is split into a great many hair-like threads of very minute diameter, which frequently curl about in an irregular manner, but often represent a phenomenon very rarely found amongst Algæ, that they form a real spiral round the gelatinous cover of one or two branches, or stems.” “I have watched the plant from the end of February to the beginning of May, without having found any fruit, or having perceived any alteration in its structure.”—*Casp. l. c.* p. 266–268 (*abridged*).

I have copied the specific character and description of this curious plant from Dr. Caspary's account published in a recent number of Taylor's ‘Annals of Natural History,’ to which I refer



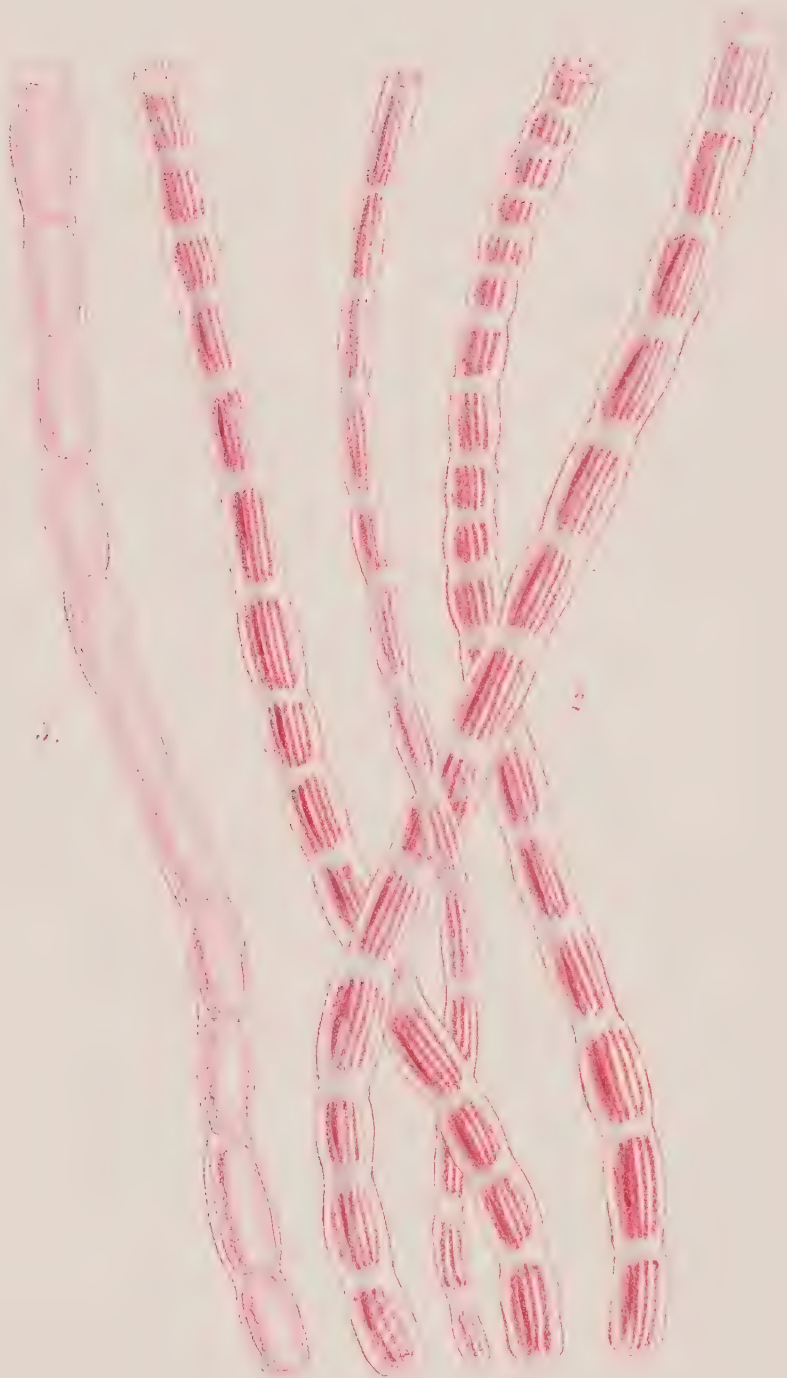
for fuller particulars and a further analysis. In our plate, fig. 3 is a little out of proportion, the sheaths and filaments being too short in proportion to their breadth, a distortion arising from their having been strongly pressed between glasses, for the purpose of separating them. Professor Kützing, who has founded the genus, describes no less than thirty-two species, several of which, probably, may be detected in this country. Whether our *S. Warreniæ* be referable to any of those enumerated, I cannot say, not having had the opportunity of comparing specimens; and being unable to determine the point from the author's short descriptions, in reading over which one is tempted to believe that the thirty-two might well be reduced at least one-half. Be this as it may, the plant now figured was added to our Flora by Dr. Caspary, and has been named by him in honour of Miss Elizabeth B. Warren, of Falmouth, a lady whose researches in natural history amply entitle her to this compliment.

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Fig. 1. Cluster of SCHIZOSIPHON WARRENIÆ :—*the natural size*. 2. Sheathed filaments removed and pressed asunder :—*magnified*. 3. Some of the same —*more highly magnified*. 4. Base of filament, with connecting cell :—*highly magnified*.

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## PLATE CCCXVII.

BANGIA? CERAMICOLA, *Chauv.*

GEN. CHAR. *Frond* filiform, tubular, composed of numerous radiating cells, disposed in transverse rows, and enclosed within a hyaline, continuous sheath. *Spores* purple or green, one formed in each of the cells of the frond. BANGIA (*Lyngb.*),—in honour of Hoffman Bang, a Danish naturalist and friend of Lyngbye.

BANGIA *ceramicola*; filaments parasitical, very slender, flaccid, elongated, rosy; articulations once or twice as long as broad, longitudinally striate; the endochrome "at length globular and escaping through the broken tube." (*Carm.*)

BANGIA *ceramicola*, *Chauv. Recherches*, &c., p. 29. *Harv. Man.* ed. ii. p. 218.

CERAMIIUM *ceramicola*, *Ag. Sp. Alg.* vol. ii. p. 155.

GONIOTRICHUM *ceramicola*, *Kütz. Phyc. Gen.* p. 244. *Sp. Alg.* p. 358. (*Excl. syn. Carm.*)

CONFERVA *ceramicola*, *Lyngb. Hyd. Dan.* p. 144. t. 48. D. *Hook. Br. Fl.* vol. ii. p. 355. *Harv. Man.* ed. i. p. 133.

HAB. Parasitical on the smaller Algæ, in tide-pools. Appin, *Captain Carmichael*. Arran, on *Polysiphonia nigrescens*, *Rev. D. Landsborough*. Torquay, on *Cutleria multifida*, *Mrs. Griffiths*.

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Filaments* about an inch or an inch and a half in length, attached at base, floating in the water like tufts of fine floss-silk, extremely slender, but not of equal diameter, some filaments being twice as broad as others, unbranched, articulated. *Articulations* either as long as broad, or, more commonly, twice as long, slightly constricted at the dissepiments, the endochrome finely striate longitudinally, and apparently consisting of radiating cellules placed side by side;—but the exact structure not easily seen after the plant has been dried, in which state, only, have I seen it, and I have not succeeded in getting a transverse section. Sometimes (as at fig. 3) the articulations appear empty; the endochrome having escaped. *Colour* a beautiful rosy red. *Substance* delicately membranaceous. In drying, the plant adheres closely to paper.

Our figure is taken from a specimen communicated by the Rev. D. Landsborough, and exhibits the characters of the plant, so far as it is possible to arrive at them from a dried specimen.

I have not been able to ascertain the exact structure:—the radiated appearance shown in the truncated ends of the magnified filaments, is only *inferred* from the striated surface, which the endochrome presents to a high magnifying power. Whether these striæ are caused by shrinking of the membrane in drying, or whether they are really (as I have supposed) the exterior faces of slender radiating cells, cannot be determined without an examination of a fresh specimen.

I have not seen any specimen from Captain Carmichael, and, therefore, am unable to assert the identity of what I now figure with his plant. My specimens\* do not show the running together of the endochrome into a sporidium as he describes, and the articulations, though sometimes short, are more usually twice as long as their diameter.

This plant is referred to *Bangia*, at the suggestion of M. Chauvin. I do not think it strictly accords with the proper structure of that genus; but it may remain in that convenient receptacle until its true structure is fully made out. Should it eventually be made the type of a new genus, I fear Kützinger's *Goniotrichum* can scarcely be adopted, because he confounds under that name both *Bangia? elegans*, Chauv., and *Bangia ciliaris*, Carm., two very distinct plants, and the latter a true *Bangia*.

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Fig. 1. Tufts of BANGIA? CERAMICOLA, growing on an old piece of *P. nigrescens*:—*the natural size*. 2. Portions of four filaments, showing the variations of size and length of joints. 3. An empty filament:—*the two last figures very highly magnified*.

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\* While this sheet is passing through the press, I have received from Mr. Landsborough a specimen which shows the commencement of the fruiting process described by Carmichael, and in which the articulations are shorter than in the specimen I have figured. I no longer entertain any doubt of the identity of Carmichael's and my plants.







## PLATE CCCXVIII.

MESOGLOIA GRIFFITHSIANA, *Grev.*

GEN. CHAR. *Frond* filiform, much branched, gelatinous; the axis composed of longitudinal, subsimple, interlacing fibres, invested with gelatine; the periphery formed of radiating, dichotomous, coloured filaments. *Fructification*: ovate or elliptical, olivaceous spores, attached to the filaments of the periphery. MESOGLOIA (*Ag.*),—from μέσος, *the middle*, and γλοιος, *viscid*; from the gelatinous axis.

MESOGLOIA *Griffithsiana*; frond slender, equal throughout; branches alternate or irregular, filiform, long, simple, nearly bare of ramuli.

MESOGLOIA *Griffithsiana*, *Grev. MS. Hook. Br. Fl.* vol. ii. p. 387. *Wyatt, Alg. Danm.* no. 48. *Harv. Man.* ed. 2. p. 47. *Kütz. Sp. Alg.* p. 545.

HAB. In rock-pools between tide-marks, rare. Annual. Summer. Livermead, Torbay, *Mrs. Griffiths*. Sidmouth, *Miss Cutler*. Roundstone, *Mr. M'Calla*.

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. *Root* a small disc. *Fronds* growing in tufts, filiform, about a line in diameter, and from twelve to eighteen inches in length, with a percurrent, undivided stem, set throughout with long, spreading, slender branches, which are mostly simple and often naked, or having a very few spreading or divaricating branchlets scattered at irregular intervals. When the plant is in a growing state it is clothed with colourless, horizontal fibres, spreading from every portion of the stem and branches, and making them look, when seen under water, of much greater diameter than they really are. In age the axis decays, and the branches become hollow. The filaments of the periphery are closely set, club-shaped, and beautifully beaded. The spores are obovate, and raised in short pedicels. *Colour* a rather pale olive-green, becoming greener in fresh water. *Substance* gelatinous, flaccid, slippery. In drying, the frond shrinks considerably, and adheres closely to paper.

This species bears a striking resemblance in its ramification to *Chordaria flagelliformis*, but is always of a much paler colour, and the microscopic structure very different; the axis being much less dense, and the substance more gelatinous and tender. Still there is a considerable similarity in structure, and evidently an affinity, through this species, between the two genera.

*M. Griffithsiana* worthily bears the name of its discoverer, so



often mentioned in the pages of this work, who has added so many original observations on the British Algæ to the common stock, and has been the first to notice so many new species. More recently this plant has been gathered on the shores of Heligoland in the Baltic, and also on the northern coasts of France. It is nowhere very common.

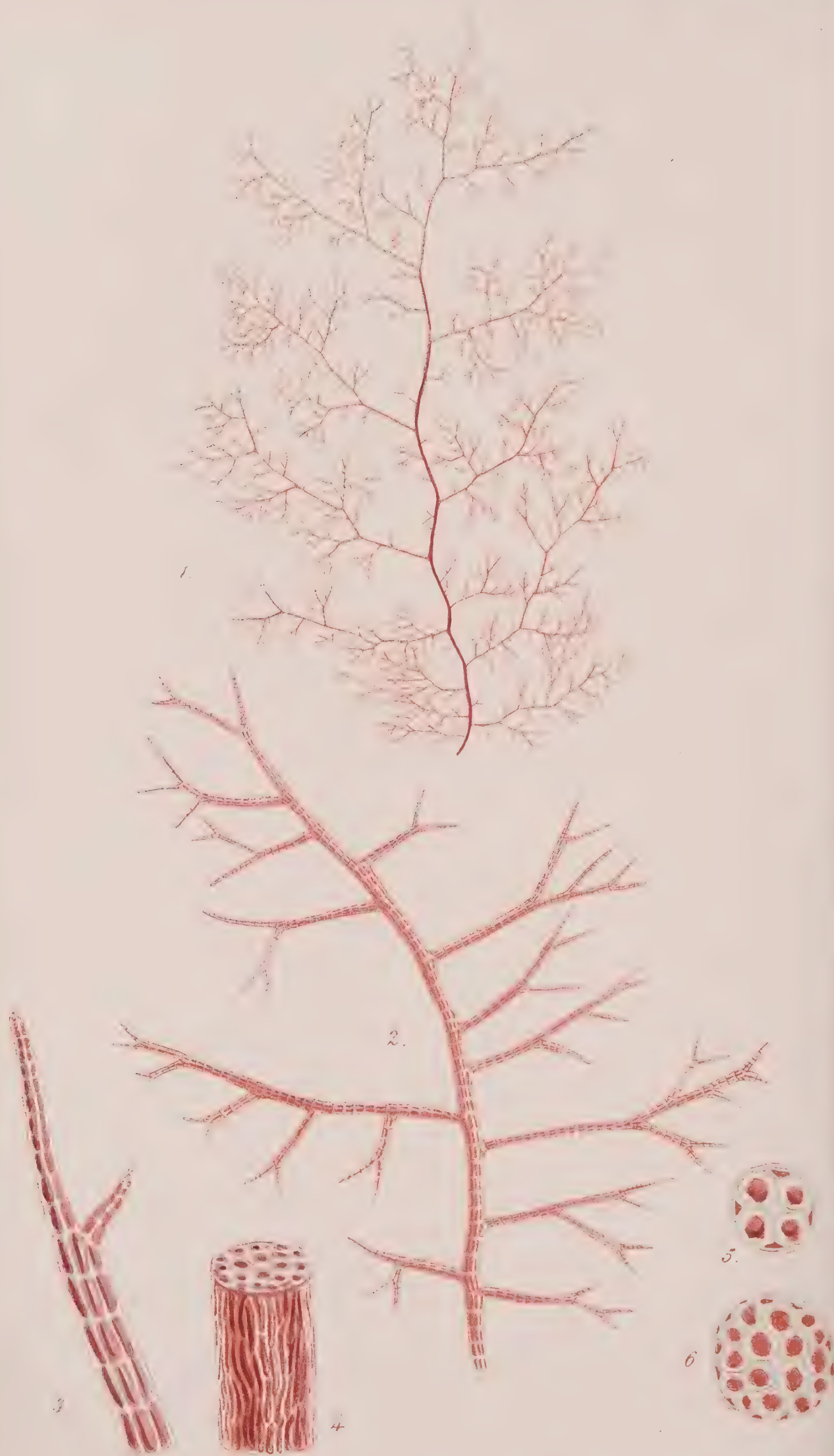
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Fig. 1. MESOGLOIA GRIFFITHSIANA :—*the natural size*. 2. A portion of a branch :—*slightly magnified*. 3. One of the colourless fibres. 4. Transverse section of the stem. 5. A spore and one of the filaments of the periphery :—*all more or less highly magnified*.

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## PLATE CCCXIX.

POLYSIPHONIA CARMICHAELIANA, *Harv.*

GEN. CHAR. *Fronde* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from *πολυς*, *many*, and *σιφων*, *a tube*.

POLYSIPHONIA *Carmichaeliana*; stem inarticulate, percurrent, flexuous, rigid, set throughout with lateral, alternate, inarticulate, divaricating branches; ramuli scattered, very patent, irregularly forked, articulate; articulations as long as broad, three-tubed.

POLYSIPHONIA *Carmichaeliana*, *Harv. in Hook. Br. Fl.* vol. ii. p. 328. *Harv. Man.* ed. 2. p. 87.

POLYSIPHONIA *divaricata*, *Carm. MS.* (not of *Agardh*).

HAB. Parasitical on *Desmarestia aculeata*. Appin, *Capt. Carmichael*.  
Very rare.

GEOGR. DISTR. (Not known elsewhere.)

DESCR. *Filaments* tufted, but not densely so, about four inches high, rigid, thicker than hog's bristles; *stem* undivided, running through the frond, bent alternately from side to side in a slightly angular manner, inarticulate, furnished throughout with lateral branches. *Branches* widely spreading and divaricating, bent like the stem, and furnished with very patent or horizontal lesser branches, which in their turn bear numerous scattered irregularly-forked ramuli, standing at right angles to the branch from which they grow. The whole aspect of the plant is thorny and irregular, and the substance rigid. The small branches and ramuli are alone articulated; their articulations are about as long as broad, and three-tubed; and a transverse section shows four large primary siphons with external secondary cells at the angles. *Fruit* unknown. *Colour* a dark brown-red, changing to black in drying, in which state the plant adheres very imperfectly to paper.

I here figure a specimen collected by Capt. Carmichael, at Appin, and now preserved in the rich Herbarium of Sir W. J. Hooker. No one but Carmichael has met with this plant, to my knowledge, and he only found it once. Its characters are



so peculiar that I formerly considered myself justified in assigning it a specific name. How far I acted wisely may be questioned. At any rate, as it has borne a name in British works for many years, it is right that it should now be figured, that persons visiting the western shores of Scotland may look out for it. Rigid and spiny as it looks, I have sometimes thought that it may be only an extravagant form of *Pol. fibrillosa*.

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Fig. 1. POLYSIPHONIA CARMICHAELIANA :—*the natural size*. 2. A portion of a secondary branch with ramuli. 3. Apex of a ramulus. 4. Portion of the stem. 5. Cross section of a small branch. 6. Cross section of the stem :—*all more or less magnified*.

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## PLATE CCCXX.

POLYSIPHONIA SPINULOSA, *Grev.*

GEN. CHAR. *Fronde* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from *πολυς*, many, and *σιφων*, a tube.

POLYSIPHONIA *spinulosa*; “dark red; branches divaricate, somewhat rigid, the ramuli short, straight, subulate, divaricate; articulations about equal in length and breadth, three-tubed; tubercles” (young *ceramidia*) “globose, sessile, excessively minute.” *Grev. l. c.*

POLYSIPHONIA *spinulosa*, *Grev. Scot. Crypt. Fl.* t. 90. *Harv. in Hook. Br. Fl.* vol. ii. p. 330. *Harv. Man.* ed. 2. p. 84.

HAB. “Sea-shores” (probably in tide-pools) at Appin, *Captain Carmichael*. Very rare.

GEOGR. DISTR. —?

DESCR. “*Fronde* 1–2 inches in length, of a dark red colour, much branched, with a rigid and spinulose habit; main branches rather remote, irregular, much divaricated, somewhat flexuous; ultimate ramuli straight, subulate, almost thorn-like, divaricated like the rest, sometimes minutely divided at the apex, and each of the divisions terminated in a long, hyaline, jointed filament. *Articulations* about as long as broad, striated with three internal tubes of a pale brown-pink under the microscope. *Tubercles* very minute, quite sessile, round, dark red, scattered freely on the branches, and containing several dark granules.”—*Grev. l. c.* A transverse section of the stem (fig. 5) shows four primary siphons of large size, with secondary and tertiary cells at the angles. In drying, the plant adheres to paper.

One of our rarest species, only found by Captain Carmichael, and by him only once, and now figured from a specimen preserved in the Hookerian Herbarium. The resemblance between *P. spinulosa* and our *P. Carmichaeliana* is great, but *P. spinulosa* is a much smaller and more delicate plant, and its stems are articulated throughout.

I have copied Dr. Greville's specific character and description, and refer to his excellent figure in the 'Scot. Crypt. Flora.' The "tubercles" above described are evidently young ceramidia; the specimen having been collected just as they were putting forth. It is obvious from an inspection of the figure that they are metamorphosed ramuli, occupying exactly the position of ramuli. They are profusely scattered over all the branches of the specimen I examined.

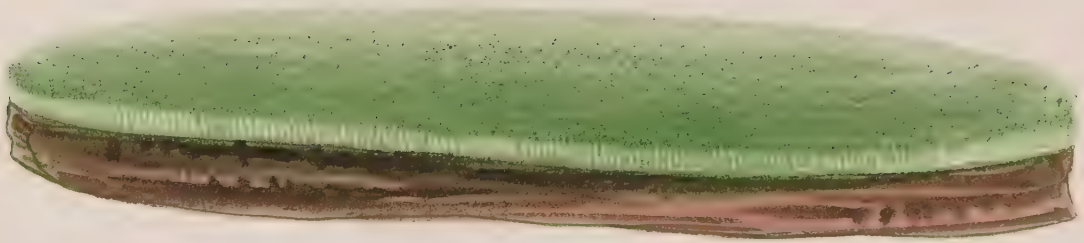
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Fig. 1. POLYSIPHONIA SPINULOSA:—*the natural size.* 2. A branch. 3. A small branch and ramuli, with apical fibres and young ceramidia. 4. Cross section of one of the smaller branches. 5. Cross section of the stem:—*all more or less highly magnified.*

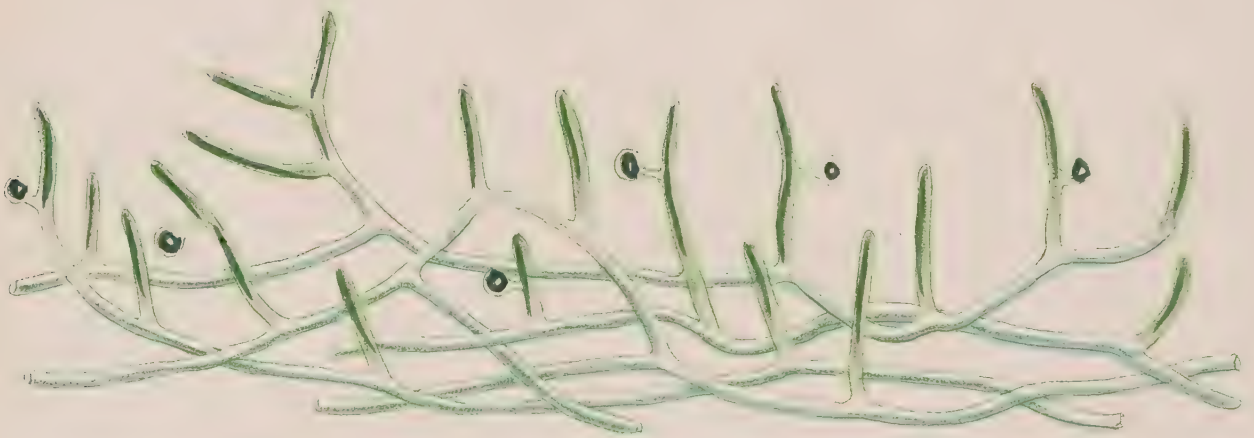
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1.



2.



3.

## PLATE CCCXXI.

VAUCHERIA VELUTINA, *Ag.*

GEN. CHAR. *Fronds* aggregated, tubular, continuous, capillary, coloured by an internal, green, pulverulent mass. *Fructification*, dark green, homogeneous *sporangia* (*coniocystæ*), attached to the frond.—*Grev.* VAUCHERIA (*De C.*),—in honour of *M. Vaucher*, a distinguished Swiss writer upon fresh-water *Confervæ*, &c.

VAUCHERIA *velutina*; filaments creeping; branches erect, fastigiate, woven into a velvety stratum; sporangia solitary, globose, lateral, on short stalks.

VAUCHERIA *velutina*, *Ag. Syst.* p. 312. *Hook. Br. Fl.* vol. ii. p. 319. *Harv. Man.* ed. 1. p. 147. ed. 2. p. 196. *Kütz. Syst. Alg.* p. 487.

HAB. On the muddy sea-shore, and on mud-covered rocks, between tide-marks, generally above half-tide level. Annual. Spring and summer. Appin, *Capt. Carmichael*. Miltown Malbay; Ross Begh; Cushendall, and several other places on the Irish coast, *W. H. H.* (Probably all round the coast.)

GEOGR. DISTR. Shores of Europe.

DESCR. This plant forms widely spreading, velvety patches, from a few inches to several feet in diameter, and from a quarter of an inch to an inch in thickness. The lower part of the mass consists of innumerable, irregularly branching, interwoven, capillary fronds, of a tough membranous consistence; the larger portion of them being usually dead, with a very offensive odour. The upper stratum of filaments alone exhibits marks of vegetation. The greater portion of each filament is decumbent, but here and there it throws up erect, short branches of nearly equal length, or standing at equal height, and these, closely placed together though originating in separate prostrate threads, from the pile of the velvet-like patch. The lower portions of the tubular filamentous frond are colourless and empty—the upper, and especially the erect branches contain a bright green granular fluid. *Sporangia* globose, very dark green with a pellucid border; each borne at or near the apex of a short branchlet. *Colour* of the stratum a dark, shining green, when free from mud, which frequently nearly chokes the plant.

The specimen here figured was gathered at Cushendall, on the Antrim coast, where the plant grows in scattered patches, over rocks slightly coated with mud, and covered by every tide. It was in fructification in August, but appeared to be rather past

its prime. When properly developed, as on flat, muddy shores, the velvety stratum frequently carpets the mud, with its intense green coating, over a very large extent of surface. The filaments of which the mass consists are inextricably and most closely woven together.

To the naked eye *V. velutina* bears a close resemblance to the fresh-water *V. cæspitosa*, but is less cushioned, and the upright branches forming the pile are shorter.

I take this opportunity of soliciting freshly gathered and fertile specimens of *V. marina* and *V. submarina*, for the purpose of figuring—or the loan and liberty to use drawings of these species made from the living specimen. Dried specimens of these plants are of little value.

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Fig. 1. Patch of VAUCHERIA VELUTINA :—*the natural size*. 2. Filiform fronds of which the mass is composed :—*magnified*. 3. Small portions of the same, with fructification :—*highly magnified*.

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## PLATE CCCXXII.

BANGIA CILIARIS, *Carm.*

GEN. CHAR. *Frond* filiform, tubular, composed (in typical species) of numerous, radiating cellules, disposed in transverse rows, and enclosed within a hyaline, continuous sheath. *Spores* purple or green, one formed within each of the cells of the frond. BANGIA (*Lyngb.*), —in honour of Hoffman Bang, a Danish botanist and friend of Lyngbye.

BANGIA *ciliaris*; filaments gregarious, very minute, simple, straight, compressed, purple; grains two or three in each transverse band, globose, sometimes solitary.

BANGIA *ciliaris*, *Carm. MSS.* *Hook. Br. Fl.* vol. ii. p. 316. *Harv. Man.* ed. 1. p. 172. ed. 2. p. 218. *Chauv. Recherches*, p. 37.

GONIOTRICHUM *ceramicola*, Var. *a. simplex*? *Kütz. Sp. Alg.* p. 358. (*so far as reference to Carm. and Chauv.*)

HAB. On the margins of old leaves of *Zostera marina*. Annual. Spring. Appin, *Capt. Carmichael*.

GEOGR. DISTR. Shores of Scotland, and the north of France.

DESCR. *Filaments* gregarious, about half a line in length, fringing the leaves of *Zostera* in narrow patches one or more inches in length. Each little thread is erect, straight, or slightly curved, variable in diameter, sometimes containing but a single series or row of granules; oftener containing a double row, and now and then a triple row. All these variations of structure sometimes occur in the same plant, in which case one portion is broader than another, and usually it is the middle portion which is distended. The *granules* are roundish, somewhat depressed at the poles, and of a brilliant purple colour.

By much the most minute of the genuine species of *Bangia*, and not very different from what the youngest state of *B. fusco-purpurea* may be supposed to be. I have seen no specimens but those found by Capt. Carmichael, and now deposited in the Hookerian Herbarium, and from one of these our figure and description have been taken. Capt. Carmichael describes it as commonly fringing the leaves of *Zostera* at Appin, and probably it may be found in many places where it has been overlooked, its minute size protecting it from all but a very careful eye.



On the other hand, its bright colour will make it be easily detected, when specially sought for.

By comparing the figure now given with that of *Bangia ceramicola* (Plate CCCXVII.), the differences between these species may readily be seen; differences which preclude us from regarding them as states of the same plant, as Kützing supposes. Possibly that acute author, not having seen any specimen of our British plant, first described by Capt. Carmichael, has mistaken some other plant for it.

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Fig. 1. Portion of a leaf of *Zostera marina*, fringed with *BANGIA CILIARIS*:—  
*the natural size.* 2. Fronds of *Bangia ciliaris*, of different diameters:—  
*highly magnified.*

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## PLATE CCCXXIII.

ELACHISTEA SCUTULATA, *Duby.*

GEN. CHAR. *Frond* parasitical, consisting of a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base, composed of vertical branching fibres, closely combined into a cartilaginous mass. *Fructification*, pear-shaped spores attached near the bases of the filaments, concealed in the tubercle, and frequently accompanied by paranemata. ELACHISTEA (*Fries*),—from *ελαχιστα*, the *least*; from the small size of these plants.

ELACHISTEA *scutulata*; filaments short, rising from an oblong, convex, shield-like tubercle, composed of densely packed, branching fibres; articulations twice or thrice as long as broad; spores oblong.

ELACHISTEA *scutulata*, *Duby*, *Bot. Gall.* vol. ii. p. 972. *Harv. Man.* ed. 2. p. 50. *Kütz. Syst. Alg.* p. 540. *J. Ag. Sp. Alg.* p. 11.

CONFERVA *scutulata*, *Eng. Bot.* t. 2311. *Harv. in Hook. Br. Fl.* vol. ii. p. 355. *Harv. in Mack. Fl. Hib.* part 3. p. 227. *Harv. Man.* ed. 1. p. 132. ed. 2. p. 50. *Wyatt, Alg. Danm.* no. 223.

HAB. Parasitical on the thongs of *Himanthalia lorea*. Annual. Summer and autumn. Very common.

GEOGR. DISTR. Shores of Europe.

DESCR. *Tubercles* forming oblong swellings on the thongs of *Himanthalia*, from half an inch to one, two, or more inches in length, and from a quarter to nearly half an inch in thickness; sometimes extending along the edges of the thong, sometimes occupying its surface, or wholly clasping it round. The *tubercle* is of a very solid, cartilaginous consistence, composed of extremely closely packed, dichotomous, hyaline filaments, whose cells are somewhat pyriform: it continues to grow in thickness as the plant advances to maturity. The apices of these branching filaments, at the outer edge of the tubercle, bear closely-packed *paranemata*, and long, free, penicillate filaments; with *spores* concealed among the paranemata. Penicillate-filaments cylindrical, their cells nearly empty below, toward the apex filled with an olive-coloured granular fluid. *Articulations* about thrice as long as broad. *Spores* oblong, very obtuse at both ends, borne on long pedicels. *Substance* cartilaginous, with a slimy surface. In drying the plant shrinks considerably, and under pressure adheres to paper.

This curious parasite, quite an interesting object under the microscope, is found wherever *Himanthalia lorea* (*Sea-thongs*) abounds. It frequently completely covers the long, strap-shaped

receptacle of that plant for the space of several inches, forming swellings of a dark colour and very slippery surface.

By Prof. Kützing this species alone is retained in the genus *Elachistea*, the other species of authors being placed by him either in *Phycophila* or in *Myriactis*. There are some minor differences of structure observable among these plants, chiefly as respects the composition and degree of development of the tubercular base, but there is so close a resemblance in habit, and such an identity of nature running through the whole, that I am unwilling to cumber the science with additional generic names.

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Fig. 1. Shields of *ELACHISTEA SCUTULATA* on part of a thong of *Himanthalia lorea*:—*the natural size*. 2. Vertical slice of a portion of the tubercle, and of the surface of the nurse-plant. 3. Small portion of the same, showing the *short* filaments (or paranemata); a spore; and one of the long filaments, &c.:—*highly magnified*.

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## PLATE CCCXXIV.

LEATHESIA TUBERIFORMIS, *S. F. Gray.*

GEN. CHAR. *Fronde* globose or lobed, fleshy, composed of jointed, colourless, dichotomous filaments, issuing from a central point; their apices, which constitute a fleshy coating to the frond, coloured and tufted. *Fructification*, oval or pyriform *spores*, concealed among the coloured apical filaments. LEATHESIA (*S. F. Gray*),—in honour of the Rev. G. R. Leathes, a British naturalist; and who first communicated this plant to Sir J. E. Smith.

LEATHESIA *tuberiformis*; fronds olivaceous, tuberous, when young stuffed with cottony fibres, at length hollow.

LEATHESIA *tuberiformis*, *S. F. Gray*, *Nat. Ar. Br. Pl.* vol. i. p. 301. *Harv. Man.* ed. 2. p. 48.

LEATHESIA *marina*, *Endl. 3rd Supp.* p. 23. *Kütz. Sp. Alg.* p. 543. *J. Ag. Sp. Alg.* vol. i. p. 52.

LEATHESIA *difformis*, *Aresch. Enum. Phyc. Scand.* p. 154. t. 9. f. B.

CORYNEPHORA *marina*, *Ag. Syst.* p. 24. *Harv. in Hook. Br. Fl.* vol. ii. p. 390. *Harv. Man.* ed. 1. p. 46. *Wyatt, Alg. Danm.* no. 149. *Grev. Crypt. Scot.* t. 53. *Harv. in Muck. Fl. Hib.* part 3. p. 184.

CHÆTOPHORA *marina*, *Lyngb. Hyd. Dan.* p. 193. t. 66.

NOSTOC *marinum*, *Ag. Disp.* p. 45. *et Syn.* p. 133.

TREMELLA *difformis*, *Linn. Syst. Nat.* p. 714. *Huds. Fl. Ang.* vol. ii. p. 565. *With.* vol. iv. p. 82.

RIVULARIA *tuberiformis*, *E. Bot.* t. 1956.

HAB. Between tide-marks, on rocks, corallines, and the smaller Algæ; very common. Annual. Summer and autumn.

GEOGR. DISTR. Atlantic shores of Europe. Baltic Sea. East coast of North America. Cape of Good Hope, common, *W. H. H.*

DESCR. *Fronde*s when growing on Algæ scattered or solitary, when on rocks usually heaped together and much crowded, forming wide-spreading tuberculated masses, very variable in size, from that of a pea to that of a large walnut. When young, the interior of the tuberous frond is stuffed with weak, empty, dichotomous, cobweb-like fibres, rising from the base and radiating in all directions, but as the outer wall extends, these gradually perish, and the plant becomes a hollow ball. The lowermost cells of the cobwebby fibres are very long and slender; the upper ones become gradually shorter and wider, and are two-horned, or somewhat half-moon-shaped, a new cell springing from each cusp; those which adjoin to the outer wall are small and globose. The outer wall is formed of closely-packed, moniliform, club-shaped, vertical filaments, lying in a transparent jelly; each filament formed of several spherical cells containing olive granules. *Spores* pyriform, sunk among the club-shaped peripheric filaments, with



which they appear to be homologous. *Colour* a brownish olive. *Substance* cartilaginous. In drying this plant shrinks considerably, and closely adheres to paper if pressed.

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Common on all our rocky shores, first appearing about April or May in the form of little, pea-like buttons, attached to small Algæ, or grouped in clusters on the surface of rocks and coral-lines, and, as the season advances, gradually acquiring size; the fronds becoming hollow and cohering in masses. In its young state it constitutes, according to Areschoug, the *Corynophlæa baltica* of Kützing. Not having seen any specimen of the plant so named, I am unable to decide the question.

By most continental authors the specific name *marina* is adopted for this plant, a name which I find for the first time in Agardh's *Dispositio Algarum Sueciæ*, published in 1811. Areschoug alone adheres to the older Linnæan name *difformis*, and if either of these be adopted, the latter is surely preferable, not merely from its elder birth, but because it expresses a natural character of this *deformed*-looking or double-faced plant, while *marina* applies alike to every species of the genus, and even of the family (*Chordarieæ*) to which it belongs:—so that one might as well talk of a *marine sea-weed* as of a *marine Leathesia*. I adopt the name selected by the founder of the genus, and which dates from 1809 (*E. Bot.* t. 1956), because it well expresses the aspect of the plant,—“like a cluster of small potatoes,”—and is at least two years older than *marina*. It is strange that Sir J. E. Smith should have overlooked the *Tremella difformis* of Linnæus, if that plant were rightly taken up by Hudson and Lightfoot.

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Fig. 1. LEATHESIA TUBERIFORMIS, in various stages:—*the natural size*.  
2. Portion of a longitudinal slice, showing the dense coloured outer wall, or crust, and some of the cobwebby fibres. 3. Apices of the cobwebby fibres, and some of the club-shaped filaments. 4. Some of the same, with spores:—*all more or less highly magnified*.

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PLATE CCCXXV.

CALLITHAMNION MESOCARPUM, *Carm.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opaque and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*),—from *καλλος*, *beauty*, and *θαμνιον*, a *little shrub*.

CALLITHAMNION *mesocarpum*; stems rising from creeping filaments, erect, simple or sparingly branched; branches alternate, very erect, naked, or having a few, scattered, erect ramuli; articulations four or five times as long as broad; tetraspores elliptical, on long, simple or forked, lateral pedicels.

CALLITHAMNION *mesocarpum*, *Carm. Alg. Appin. MSS.* *Harv. in Hook. Br. Fl.* vol. ii. p. 348. *Harv. Man.* ed. 1. p. 116. ed. 2. p. 184. *Kütz. Sp. Alg.* p. 642.

HAB. On rocks at the extremity of low-water mark, very rare. Appin, *Capt. Carmichael*.

GEOGR. DISTR.

DESCR. “*Tufts* continuous, forming a broad, shaggy, purple crust.” *Carm.* *Stems* from an eighth to a quarter inch or rather more in height, springing from decumbent filaments, which are attached to the surface of the rock by little rootlets, erect, simple or having two or three alternate or secund branches. *Branches* issuing at very acute angles, erect, virgate, either quite naked or furnished with a few, distant, erect, scattered, few-jointed ramuli. *Articulations* four or five times as long as broad, with wide borders. *Tetraspores* elliptical, borne on the tips of the lateral ramuli, which are generally one-jointed and either simple or forked, in which case, one arm of the fork is converted into a tetraspore. *Favellæ* unknown. *Colour* a full deep lake. *Substance* membranaceous, adhering to paper in drying.

Capt. Carmichael, in describing this plant, says, “I could not discover that it sprang from creeping filaments;”—a remark which induced me formerly to place it in the section with *C. Rothii* and *C. floridulum*. But on recently inspecting Capt.



Carmichael's original specimens, in the Hookerian Herbarium, I clearly made out the existence of a creeping *rhizome* from which the erect stems spring, and this species should therefore be removed to the section of *C. Turneri* and *C. pluma*. It comes so close, indeed, to some states of *C. Turneri*, particularly to those varieties constituting *C. repens* of authors, that it may fairly be questioned whether *C. mesocarpum* should not be erased altogether from the list of species, and referred as a synonym to *C. Turneri*. Capt. Carmichael's specimen is mixed with fronds of *C. pluma*. This is curious, as both were found growing on bare rocks, and *C. pluma* is well known to prefer the stems of *Laminariæ*.

The figure here given has been prepared from authentic specimens in Herb. Hook. The upper figure (fig. 1) is, of course, imaginary; the specimens examined being merely a few fronds, partly preserved on talc, and partly on paper.

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Fig. 1. Tuft of *CALLITHAMNION MESOCARPUM*:—*the natural size*. 2. Some of the fronds:—*magnified*. 3. Portion of a branch with tetraspores:—*highly magnified*.

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## PLATE CCCXXVI.

DICTYOSIPHON FŒNICULACEUS, *Grev.*

GEN. CHAR. *Root* a small, naked disc. *Frond* filiform, tubular, branched; its walls composed of several rows of cells, of which the inner are elongated, and connected in longitudinal filaments; the outer small, polygonal, forming a membrane. *Fructification*, solitary or aggregated naked *spores*, scattered irregularly over the surface. DICTYOSIPHON (*Grev.*),—from δίκτυον, a *net*, and σίφων, a *tube*; because the frond is hollow, and has a netted surface.

DICTYOSIPHON *fœniculaceus*; frond setaceous, very much branched; branches capillary, decompound; ramuli subulate, alternate or scattered, rarely opposite.

DICTYOSIPHON *fœniculaceus*, *Grev. Alg. Brit.* p. 56. tab. viii. *Hook. Br. Fl.* vol. ii. p. 279. *Wyatt, Alg. Danm.* no. 205. *Harv. in Mack. Fl. Hib.* part 3. p. 176. *Harv. Man.* ed. 1. p. 32. ed. 2. p. 40. *J. Ag. Sp. Alg.* vol. i. p. 82. *Kütz. Sp. Alg.* p. 485. *Aresch. Phyc. Scand.* p. 147. t. 6, 7, 8 (in part). *E. Bot. Suppl.* t. 2746.

SCYTOSIPHON *fœniculaceus*, *Ag. Sp. Alg.* vol. i. p. 164. *Ag. Syst.* p. 258. *Lyngb. Hyd. Dan.* p. 63. t. 14.

FUCUS *subtilis*, *Turn. Hist.* t. 234.

CONFERVA *fœniculacea*, *Huds. Fl. Angl.* vol. ii. p. 594. *Light. Fl. Scot.* vol. ii. p. 981.

CONFERVA *marina fœniculacea*, *Dill. Hist. Musc.* p. 16. t. 2. f. 8.

HAB. In rock-pools, between tide-marks, either on stones, or growing parasitically on other Algæ. Annual. Spring and summer. Common on the coast.

GEOGR. DISTR. Atlantic shores of Europe and of North America. Baltic Sea.

DESCR. *Root* a very small disc. *Stem* from six inches to one or two feet or more in length, varying from a quarter to half a line in diameter, generally undivided, but densely furnished throughout its entire length with lateral branches. *Branches* long, similar to the stem, and excessively branched in a very irregular manner. Sometimes the secondary branches are very densely set, capillary, elongated and simple, or nearly so. Sometimes they are short, curved, and twice or thrice divided. Commonly they are decompound and bushy, plentifully furnished with subulate, acute ramuli, which are either scattered or rarely opposite. When young, the whole frond is densely clothed with pellucid, jointed hairs. It is at first solid, but the central cells, which are much larger than the rest, are also weaker and soon perish, leaving the stem and branches fistular. The walls of the tube are composed of several layers of longitudinally connected cylindrical cells, of which the inner ones are elongate, the rest gradually shorter; the



cells of the superficial layer (or epidermis) being short and either square or polygonal. *Spores* scattered freely over the branches. (On some individuals I have observed aggregated spores, forming scattered clusters or sori.) *Colour* a pale olivaceous, becoming darker in age and on being dried. *Substance* membranaceous and soft, closely adhering to paper in drying.

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A common inhabitant of tide-pools, and not inelegant, especially when clothed with the fine soft hairs which cover its surface closely, when in a young and vigorous state, before it has suffered from the wear and tear of its short existence.

I believe by most British algologists this plant is regarded as *sui generis*, entitled to a clear place in our system of arrangement, and properly referred to the *Dictyotæ*. But a distinguished Swede, Areschoug, regards it unhesitatingly as an abnormal state of *Chordaria flagelliformis*, in which the horizontal filaments of the periphery have not been developed, and he states that he has found specimens having some of the branches with the structure of *Chordaria*, and some with that of *Dictyosiphon*. This is a subject worth examining, but requiring a very careful and accurate observation.

It is also possible that we have two species, or perhaps more, confounded under this name. I possess specimens collected on the west of Ireland some years ago, having rather a different habit from ordinary forms, and differing in having their spores collected in clusters, as in *Striaria*, but not disposed in transverse bands. To these I once gave the MS. name of *D. fragilis*, which is adopted by Kützinger, in his recent 'Systema Algarum.' I have deferred noticing these specimens hitherto, from an unwillingness to multiply doubtful species.

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Fig. 1. DICTYOSIPHON FENICULACEUS:—*the natural size*. 2. Portion of a branch:—*slightly magnified*. 3. Small part of the same, with *fruit* and some hairs. 4. Longitudinal section of the stem. 5. Transverse section of a young branch. 6. The same, of an older branch, now become hollow:—*all highly magnified*.

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## PLATE CCCXXVII.

CONFERVA COLLABENS, *Ag.*

GEN. CHAR. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, and having, at some period, a proper ciliary motion. CONFERVA (*Plin.*),—from *conferruminare*, to *consolidate*; because some of the species were used by the ancients for binding up fractured limbs.

CONFERVA *collabens*; filaments elongated, straight, tufted, very thick (but of various diameters), gelatinous and flaccid, of a splendid æruginous green colour; articulations from once to once and a half as long as broad, filled with a dense granular mass.

CONFERVA *collabens*, *Ag. Syst. Alg.* p. 102. *Harv. in Hook. Br. Fl.* vol. ii. p. 354. *Harv. Man.* ed. 1. p. 130. ed. 2. p. 209.

CONFERVA *ærea*  $\beta$ . *lubrica*, *Dillw. Syn.* p. 48.

HORMOTRICHUM *collabens*, *Kütz. Sp. Alg.* p. 383.

HAB. At Yarmouth, on a floating piece of deal, *Sir W. J. Hooker*. (Only once found.)

GEOGR. DISTR. German Ocean.

DESCR. *Filaments* densely tufted, three or four inches long or more, of very various diameters in the same tuft, the largest ones being twice as thick as *C. ærea* or more, the smaller not measuring one-fourth as much in diameter. *Articulations* generally somewhat longer than their diameter, filled with a brilliantly coloured, granular and dense mass of endochrome; the dissepiments much contracted, and the walls of the cells thick. *Substance* very flaccid and gelatinous, adhering most closely to paper. The *colour* is a peculiarly rich green, and is well preserved in drying.

Dillwyn notices this species, making it a variety of his *C. ærea*, in the following words:—“This curious variety, which was found on the Yarmouth beach by Mr.” (Sir William) “Hooker, in the spring of 1808, attached to a piece of deal, differs so extraordinarily from the common appearance of *C. ærea*, that, except under a microscope, nobody would suspect them of being the same. It grew in a very large tuft, and its filaments were remarkably soft, tender, slippery, and glossy, so as to float with



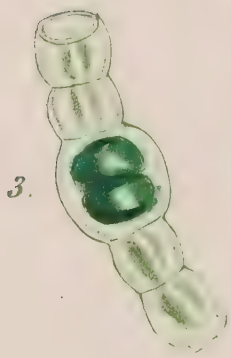
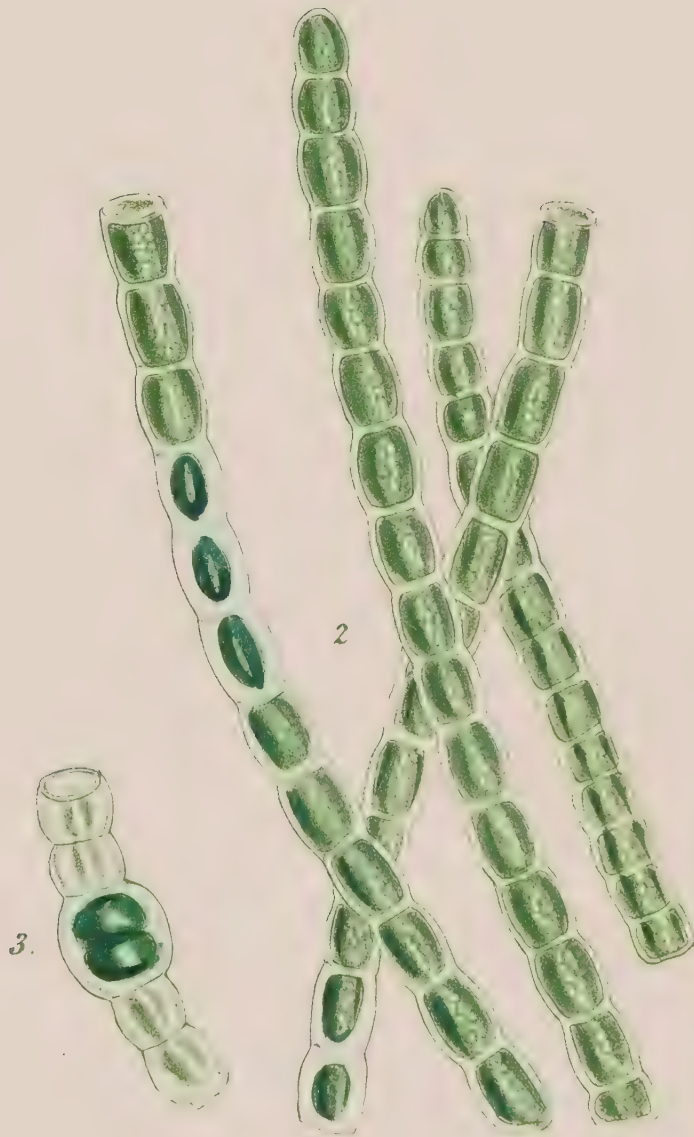
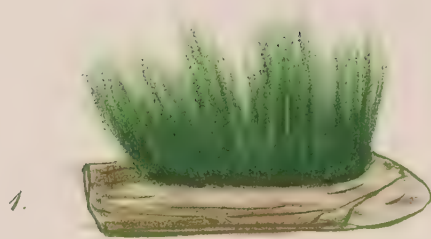
the slightest agitation of the water, and adhere closely to paper and glass in drying.” To this I have only to add that the figure here given has been drawn from the original specimen, and that no one has since met with a similar one in this country. Kützing, however, states that he has received it from the north of Germany. The filaments differ from each other very extraordinarily in diameter, so that one might suppose there were half a dozen different species under the microscope together. The specific character least variable seems to be the extreme lubricity and softness.

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Fig. 1. Tuft of CONFERVA COLLABENS:—*the natural size*. 2. Filaments of various diameters:—*all highly (and equally) magnified*.

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## PLATE CCCXXVIII.

CONFERVA YOUNGANA, *Dillw.*

GEN. CHAR. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, and having, at some period, a proper ciliary motion. CONFERVA (*Plin.*),—from *conferruminare*, to *consolidate*; because some of the species were used by the ancients for binding up fractured limbs.

CONFERVA *Youngana*; filaments short, tufted, straight or nearly so, somewhat rigid; articulations once or twice as long as broad, dissepiments finally contracted.

CONFERVA *Youngana*, *Dillw. Conf.* t. 102. *Harv. in Hook. Br. Fl.* vol. ii. p. 354. *Harv. Man.* ed. 1. p. 131. ed. 2. p. 210. *Ag. Syst.* p. 101.

CONFERVA *isogona*, *E. Bot.* t. 1930.

HORMOTRICHUM *Younganum*, *Kütz. Sp. Alg.* p. 382.

HORMOTRICHUM *isogonum*, *Kütz. Sp. Alg.* p. 382.

HAB. On rocks and stones near high water-mark, on various parts of the coast. Annual. Summer. Discovered by *W. Weston Young, Esq.*, near Dunraven Castle, Glamorganshire. Yarmouth, *Sir W. J. Hooker*. Dingle Bay, Kerry, *Mr. D. Moore*.

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Filaments* from half an inch to an inch in length, erect, straight or slightly curved, obtuse, tufted, or spreading in wide shaggy fleeces over the surface of a rock. When young, the filaments are cylindrical, but they soon become contracted at the dissepiments. The cells are occasionally only as long as broad, but are usually once and half as long. The endochrome is granular and dense, filling the cell, and of a full green colour, As it becomes mature it acquires still greater density and a darker colour, and shrinks to half its size. Finally, it is changed into a bipartite sporidium lodged in a swollen and colourless cell. *Substance* membranaceous, not very soft, and having little gloss. In drying, the plant adheres, but not very closely, to paper.

To the naked eye this plant has very much the aspect of *Lyngbya Carmichaelii*, with which (as I have already stated under Plate CCC.) it is properly a congener; but it is readily distinguished under the microscope, by the much longer cells,



and, especially in advanced specimens, by the contraction of the tube at the dissepiments. It bears a far closer resemblance to *C. bangioides*, but is a shorter and comparatively stouter plant, and far less lubricous. The contents of the cells also are more granular and dense.

It was originally discovered by Mr. W. Weston Young, a friend of Dillwyn's, to whom that author was indebted for the drawings from which the plates that illustrate his work on the British *Confervæ* were engraved, and to whom he has dedicated this pretty little species.

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Fig. 1. Tuft of *CONFERVA YOUNGANA*:—*the natural size*. 2. Portions of filaments in various stages. 3. Portion of a filament with a ripe sporidium:—*both figures highly magnified*.

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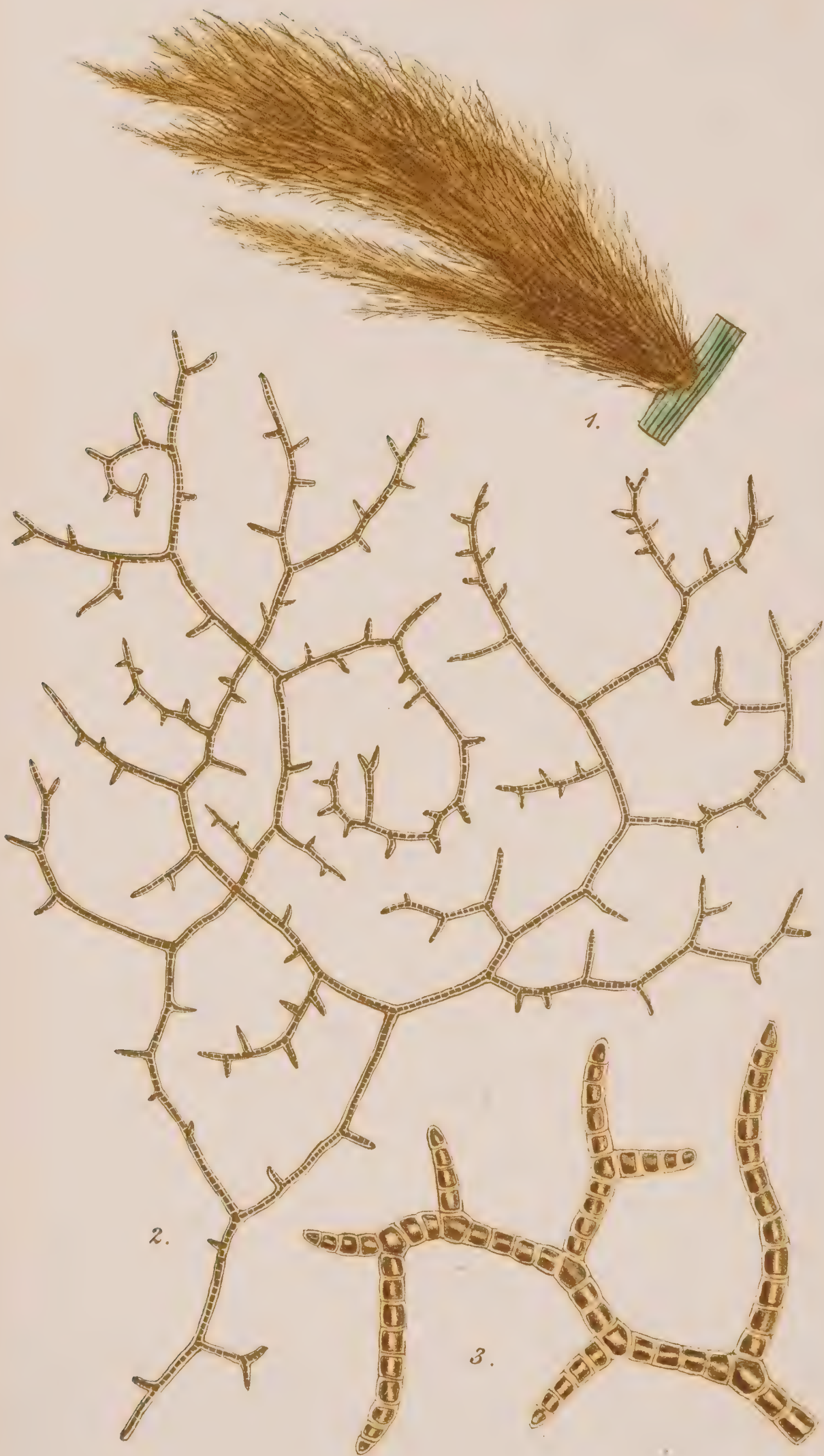




PLATE CCCXXIX.

ECTOCARPUS DISTORTUS, *Carm.*

GEN. CHAR. *Fronde*s capillary, jointed, olive or brown, flaccid, single-tubed, without longitudinal striæ. *Fruit*, either spherical or elliptical, external or imbedded *spores*; or lanceolate, linear, or conical *silicles* (pod-like bodies); or granular masses formed in consecutive cells of the branches. ECTOCARPUS (*Lyngb.*),—from *εκτος, καρπος*, *external fruit*.

ECTOCARPUS *distortus*; filaments very much branched, matted together, dark-brown, angularly bent; branches spreading at very obtuse angles, alternate or secund; ramuli horizontally patent or recurved, scattered, short, spine-like, obtuse; spores obovate, sessile or subsessile.

ECTOCARPUS *distortus*, *Carm. Alg. Appin. MSS. cum Ic. Harv. in Hook. Br. Fl.* vol. ii. p. 326. *Harv. Man.* ed. 1. p. 42. ed. 2. p. 60.

HAB. Parasitical on the leaves of *Zostera marina*. Annual. Summer and autumn. Appin, *Capt. Carmichael* (1824), *Rev. D. Landsborough* (1850).

GEOGR. DISTR.

DESCR. *Tufts* from four to eight inches long or more, very dense and full; the threads of which they are composed closely matted together and inextricable. *Filaments* very much branched, and in a very irregular manner between alternate and dichotomous; the branches spreading at very wide angles, forming almost rounded axils, and bent at intervals in a zigzag manner. Lesser branches either spreading at right angles or recurved. *Ramuli* scattered freely along the branches, divaricating, short, spine-like, but obtuse. *Articulations* pretty uniformly as long as broad, enclosing a square mass of dark-coloured endochrome, the walls of the cells thick, leaving wide colourless dissepiments. *Spores* (which I formerly examined on one of Capt. Carmichael's specimens, but which I have not succeeded in finding on the one now figured) obovate or elliptical, scattered, sessile or slightly stalked, dark brown, with a pellucid limbus. *Colour* a deep chestnut-brown. *Substance* membranaceous, and very brittle, if moistened after having been dried. The plant imperfectly adheres to paper.

In a former number, under *E. Landsburgii* (Plate CCXXXIII.) I have pointed out the marks of distinction between that species and the present, its nearest ally. A comparison of the two figures will now enable the student to appreciate the characters

of these plants, and, I hope, to discriminate between them. *E. Landsburgii* is not only more thorny in aspect, but is of a far more rigid substance, and much less transparent: nor does it grow in large densely interwoven tufts like *E. distortus*. Both species appear to be of rare occurrence.

The figure now given has been prepared partly from an original drawing by Carmichael, and partly from one of his specimens.

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Fig. 1. Tuft of ECTOCARPUS DISTORTUS:—*the natural size*. 2. Portion of a filament, to show the branching:—*magnified*. 3. Small fragment of the same:—*highly magnified*.

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## PLATE CCCXXX.

ECTOCARPUS CRINITUS, *Carm.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed, without longitudinal striæ. *Fruit*, either spherical or elliptical, external or imbedded *spores*; or lanceolate, linear, or conical *silicles* (pod-like bodies); or granular masses formed in consecutive cells of the branches. ECTOCARPUS (*Lyngb.*),—from *εκτος, καρπος*, *external fruit*.

ECTOCARPUS *crinitus*; filaments decumbent, forming extensive stratified tufts, sparingly branched; the branches subsimple, distant, elongated; ramuli few, patent; spores globose, scattered, sessile; articulations twice or thrice as long as broad.

ECTOCARPUS *crinitus*, *Carm. Alg. App. MSS.* *Harv. in Hook. Br. Fl.* vol. ii. p. 326. *Harv. Man.* ed. 1. p. 41. ed. 2. p. 60.

HAB. On muddy sea-shores. Annual. Summer. Rare. Appin, *Capt. Carmichael*. Watermouth, Devon, *Mrs. Griffiths*.

GEOGR. DISTR.

DESCR. *Filaments* from two to six inches long, forming widely spreading, fleecy tufts, which lie prostrate on the mud, at the recess of the tide, and frequently cover wide spaces. *Filaments* sparingly branched (for the genus), the branches long, distant, and subsimple, spreading at wide angles, mostly alternate, rarely opposite. *Ramuli* few, distant, scattered, divaricate or patent, short. *Articulations* twice or thrice as long as broad, containing a pale olive, rather watery endochrome. *Spores* (which I have only seen in a young state) globose, scattered, sessile. *Colour* a pale olive, becoming greener after the plant has been dried, in which state it adheres to paper. *Substance* soft and membranaceous.

I am but imperfectly acquainted with this species, which I have only seen in a dry state; and though I have repeatedly examined several parts of specimens collected by Capt. Carmichael, I have not been able to detect the fructification described by him; save in a single instance that I chanced upon the young spore represented at fig. 3. The nearest affinity of *E. crinitus* seems to be with *E. pusillus*, which has a nearly

similar ramification, but is a smaller plant, and almost always found with fruit.

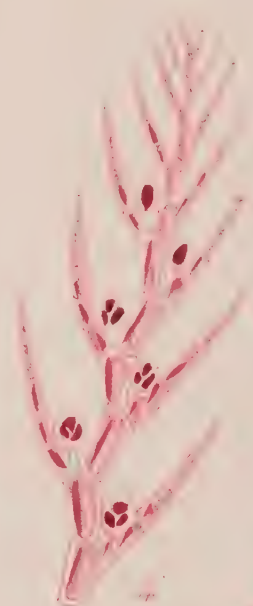
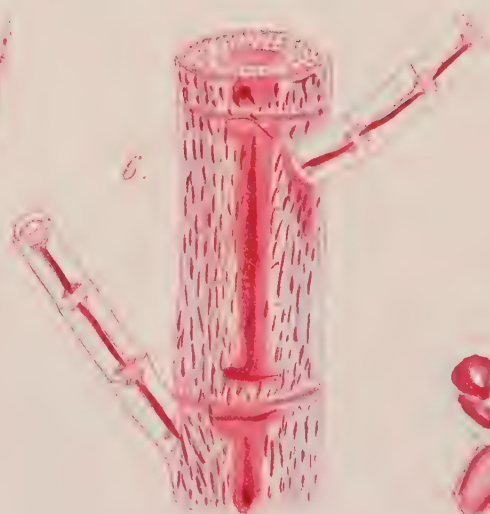
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Fig. 1. Tuft of ECTOCARPUS CRINITUS:—*the natural size*. 2. Parts of two filaments:—*magnified*. 3. Small portion with a ramulus and young spore:—*highly magnified*.

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## PLATE CCCXXXI.

CALLITHAMNION AFFINE, *Harv.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opaque and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores*, scattered along the ultimate branchlets or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches and containing numerous angular spores. CALLITHAMNION (*Lyngb.*),—from *καλλος*, *beauty*, and *θαμνιον*, *a little shrub*.

CALLITHAMNION *affine*; much branched and bushy, the stem rather opaque, full of veins; secondary branches long, having a roundish outline, alternately plumulate; plumules very narrow, simply pinnate; pinnæ short, erect, increasing in length upwards, alternate, crowded at top; articulations of the branches three or four times, of the pinnæ once and a half as long as broad; tetraspores generally solitary, rising from the basal cell of the pinnæ.

CALLITHAMNION *affine*, *Harv. in Hook. Br. Fl.* vol. ii. p. 344. *Harv. Man.* ed. 1. p. 110. ed. 2. p. 180.

HAB. Parasitical on *Fuci*, between tide-marks. Annual. Summer. Shores of Bute, *Dr. Greville*.

## GEOGR. DISTR.

DESCR. *Tufts* two to three inches high, with a somewhat pyramidal outline, the lower branches being longest, the upper gradually shorter. *Filaments* with a percurrent, nearly undivided stem, closely set, on all sides and throughout its whole length, with lateral branches. These are once or twice divided, and clothed with very narrow, elongate, erect, and slender, simply pinnated plumules, alternate, one rising from every joint of the branch. *Pinnules* short, erect, awl-shaped, the lowermost shortest and subdistant, the upper gradually longer and closer together, the terminal ones crowded and short. *Main* stem full of slender veins, and sub-opaque, its articulations twice or thrice as long as broad. *Articulations* of the branches thrice or four times as long as broad, with wide margins; those of the pinnules about once and a half as long as broad. *Tetraspores* globose, and mostly solitary, at or near the base of the pinnules. *Favellæ* in pairs, on slightly distorted branches, each favella occupying the place of a suppressed ramulus. *Colour* a deep red, pretty well preserved in drying. *Substance* membranaceous. In drying, the plant adheres closely to paper.

If this plant be really entitled to specific rank, it is well named *affine*, for it appears to be akin to several other species, and to form an intermediate link between them. To *C. Hookeri* it is allied in habit, and in the opacity of the main stem, but here the resemblance ends, for the nature of the ramification is extremely different. With *C. roseum* we may also compare it, but the narrow plumules, with short, erect pinnules, afford a clear mark of distinction. Perhaps, after all, the nearest approach is to *C. polyspermum*, which has plumules equally narrow, and pinnules equally short, and which grows in similar places; but the *solitary, basal* tetraspores of *C. affine* seem to point to another species. In making the foregoing contrasts, however, it must be borne in mind that I have compared *C. affine* only with the *normal* states of the species referred to, and no one who has studied the genus *Callithamnion* for any length of time, and in any considerable number of localities, needs to be told that there are many intermediate forms to which it is often difficult to assign the correct name. In the present instance the difficulty has been cut, rather than surmounted, by giving a name to one of these puzzling forms; but though this happened in 1832, no fortunate collector has since met with specimens which could fairly come under our *C. affine*.

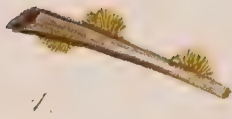
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Fig. 1. CALLITHAMNION AFFINE:—*the natural size*. 2. Part of a lesser branch, with its alternate plumules. 3. Branch bearing *favellæ*. 4. Branch with *tetraspores* on the ramuli. 5. A tetraspore on a ramulus. 6. Small portion of the main stem:—*all more or less highly magnified*.

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## PLATE CCCXXXII.

ELACHISTEA CURTA, *Aresch.*

GEN. CHAR. *Frond* parasitical, consisting of a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base, composed of vertical, branching strings of cells, closely combined into a cartilaginous mass. *Fructification*, pear-shaped *spores* attached to the bases of the filaments concealed in the tubercles, and frequently accompanied by paranemata. ELACHISTEA (*Fries*),—from ελαχιστα, the *least*; from the small size of these plants.

ELACHISTEA *curta*; filaments very short, tapering to the base, obtuse, pencilled, rather rigid, rising from a tubercle; articulations about as long as broad; spores pyriform, on long pedicels; paranemata linear-clavate.

ELACHISTEA *curta*, *Aresch. in Linn. vol. xvi. p. 234?* *Harv. Man. ed. 2. p. 50.*

CONFERVA *curta*, *Dillw. t. 76. Ag. Syst. p. 103. Harv. in Hook. Brit. Fl. vol. ii. p. 355. Harv. Man. ed. 1. p. 132.*

HAB. On *Fuci*, between tide-marks. Annual. Summer. At Swansea, *Mr. L. W. Dillwyn.* (Not found recently.)

GEOGR. DISTR.

DESCR. *Tufts* minute, from one to three lines in diameter, with an evident tubercular base. *Filaments* linear-club-shaped, very slender below, and gradually widening upwards, ending in a blunt point. *Paranemata* filiform, composed of slender cylindrical cells, and tipped with a pyriform coloured cell. *Articulations* of the filaments about as long as broad, coloured. *Spores* large, pear-shaped, on longish stalks. *Colour* a brownish-olive, or foxy. *Substance* rather rigid. The plant does not adhere to paper.

This species has long been in doubt, and notwithstanding the figure and description now given, my doubts are not fully removed. By Dillwyn, who first described *E. curta*, it is said to be common in the neighbourhood of Swansea, and probably not rare elsewhere; yet no one has met with it of late years. I have repeatedly brought home the battered stumps of *E. fucicola* in the belief, always dissipated by the microscope, that I had met with *E. curta*; and my only acquaintance with the latter is from

an examination of a poor specimen preserved in Sir W. J. Hooker's Herbarium. The accompanying figure has been prepared from that specimen.

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Fig. 1. ELACHISTEA CURTA:—*the natural size*. 2. Small part of the tuft:—*magnified*. 3. A spore, and four of the paranemata:—*highly magnified*.

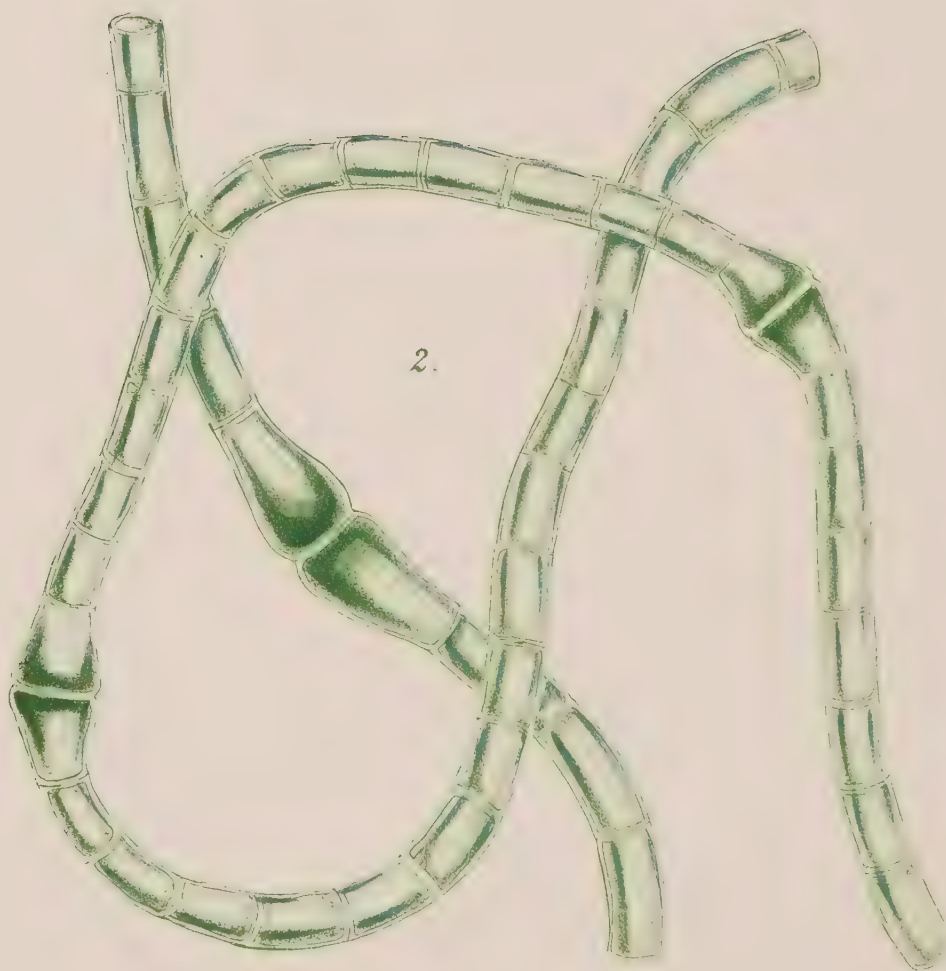
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1.



2.

## PLATE CCCXXXIII.

CONFERVA LITOREA, *Harv.*

GEN. CHAR. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the cells, having, at some period, a proper ciliary motion. CONFERVA (*Plin.*),—from *conferruminare*, to consolidate: because some of the species were used by the ancients for binding up fractured limbs.

CONFERVA *litorea*; filaments thick, rigid, crisped, forming loose, extensive bundles of a dull green colour; articulations once and half as long as broad, here and there swollen in pairs and discoloured.

CONFERVA *litorea*, *Harv. Man.* ed. 2. p. 208.

CONFERVA *linum*, *Harv. in Hook. Br. Fl.* vol. ii. p. 352. *Harv. Man.* ed. 1. p. 128. *Wyatt, Alg. Danm.* No. 220. (*not of Roth.*)

HAB. In salt-water ditches near the coast; in æstuaries, and along the muddy sea-shore, between tide-marks. Annual. Summer. Appin, *Capt. Carmichael*. Plymouth, *Mrs. Wyatt*. Bangor, North Wales, *Mr. Ralfs*. Orkneys, *W.H.H.*

## GEOGR. DISTR.

DESCR. *Filaments* three or four inches long or more, about half the diameter of *C. ærea*, loosely bundled together in prostrate or floating strata of considerable extent, and of a pale green colour, becoming darker and duller as the season advances. Each filament is irregularly curled and twisted, and sometimes angularly bent. The articulations are cylindrical, filled with a pale green watery endochrome, and about once and half as long as broad; and here and there, at irregular intervals, two proximate articulations, longer and broader than the rest, form together a spindle-shaped swelling, in which a dark-coloured endochrome collects, the mass being darkest and densest where the two cells touch each other. This looks like the commencement of fructification, but I am unable to say whether a sporangium is ultimately formed. These dark-coloured double cells are frequently so numerous that they give the filaments, when examined with a pocket lens, a variegated appearance. *Substance* membranaceous, and in drying the plant scarcely adheres to paper.

The above description is intended for the plant commonly found in British Herbaria under the name *C. linum*, Br. Fl.,

but which (as already stated under t. CL.) is very different from the plant so named by Roth ; and has, indeed, more in common with *C. tortuosa*, Dillw. I regret that I have been unable recently to compare my specimens with those found by Carmichael, and I have therefore relied for the *type* of this species on the specimens published in Mrs. Wyatt's 'Algæ Danmonienses,' as that work is in the hands of many persons. It is possible that in some collections more than one plant may be confounded under the name *linum*, Br. Fl., but I trust the figure now given will sufficiently define what I understand by that exploded species. Not having been able to identify our British specimens with any continental species, I have been forced to bestow a new name on them.

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Fig. 1. CONFERVA LITOREA :—*the natural size.* 2. Portion of two filaments :—*magnified.*

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## PLATE CCCXXXIV.

CERAMIUM STRICTUM, *Kütz.* (sp.)

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals: 1, *tetraspores*, either immersed in the ramuli, or more or less protrudent; 2, sessile, roundish *receptacles* (*favellæ*) having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth*),—from *κεραμος*, a *pitcher*; but the fruit is *not* pitcher-shaped.

CERAMIUM *strictum*; frond capillary, nearly equal, membranaceous, irregularly dichotomous, the lower forkings distant, the upper closer, all the divisions erect and straight, with narrow, acute axils; the apices straight or slightly hooked inwards; articulations colourless, those of the lower dichotomies from three to four times as long as broad, of the upper gradually shorter; dissepiments (smooth or hairy) opaque, purple; favellæ near the tips of the branches, involucrate; tetraspores erumpent, bursting from the dissepiments of the larger branches, quadrifarious.

CERAMIUM *strictum*, *Harv. Man.* ed. 2. p. 164.

GONGROCERAS *strictum*, *Kütz. in Linnæa*, 1842, p. 735. *Phyc. Gen.* p. 380. *Sp. Alg.* p. 678.

HAB. On mussel-shells, corallines, &c.; in tide-pools, near low-water mark. Torquay, *Mrs. Griffiths*. Penzance, *Mr. Ralfs*. Plymouth, *Mr. Boswarva and Dr. Cocks*. Jersey, *Miss Turner*. Dingle, Kerry, *W. H. H.* Roundstone, *Mr. M'Calla*.

GEOGR. DISTR. German Ocean, *Kütz.*

DESCR. *Filaments* capillary, from two to four inches high, densely tufted, the bases of the tufts entangled, from the presence of irregular creeping fibres. *Filaments* of nearly equal diameter throughout, dichotomous, without principal stem, but sometimes furnished with a few lateral ramuli; the lower dichotomies distant, the upper closer; all the segments of the filament straight and erect, the axils acute and narrow; the apices more or less fastigiate, generally sharply bifid, with the points incurved, but not strongly involute. *Articulations* of the middle and lower portions three to four times, of the upper twice as long as broad, and of the ultimate and penultimate forkings much shorter than their breadth. *Dissepiments* coated with dense, minute, purple cells, slightly swollen, either quite smooth, or (when young) clothed with copious, long, slender, flexible hairs. *Favellæ*



often situated in a forking of the branch, and generally in one of the uppermost forks, subtended by a few short ramuli. *Tetraspores* prominent, forming a whorl round the joint, in the upper (but not ultimate) divisions of the filament. *Colour* a dark purplish-red. *Substance* delicately membranaceous and soft. In drying the plant closely adheres to paper, and has a peculiar glassy lustre, especially in the colourless portions of the thread.

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A beautiful species, and a *tolerably* definite one, considering the genus to which it belongs! It is known from *C. nodosum* by its less patent branching, its more purple colour, and different disposition of the tetraspores, besides minor characters, more readily taken in by the eye than the ear. Sometimes the branches are found quite smooth, and at other times every node of the upper branches and ramuli is densely clothed with long, flexible hairs, which appear to be the same pubescence that Kützinger describes, and on the presence of which he founds his genus *Trichoceras*. At first, on noticing these hairs, abundantly clothing a specimen sent by Miss Turner from Jersey, I was disposed to regard them as a specific character, and to suspect that I had before me *Trichoceras villosum* of Kützinger. Whether this be so or not, I soon abandoned all thoughts of grounding a species on the presence or absence of such hairs, for I found, on examining numerous splendid specimens sent to me by Mr. Boswarva and Dr. Cocks, that nothing could be more inconstant; branches from the same tuft differing in the degree of hairiness, and specimens from the same locality, and identical in all other characters, being some hairy, some perfectly smooth. Lastly, on re-examining my original Dingle specimens, which had been acknowledged by Kützinger himself to be truly his *C. strictum*, I found traces of similar pubescence. And such hairs are by no means restricted to this species, but occur on *C. rubrum*, and probably on most other species. They are, I suspect, organs of the same nature as the *fibrillæ* of *Polysiphoniæ*, and if this be the case we may expect to find *antheridia* on them.

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Fig. 1. CERAMIIUM STRICTUM:—*the natural size*. 2. Portions of two filaments, one hairy, the other smooth. 3. Part of a branch, with a *favella*. 4. Part of a branch, with *tetraspores* in situ. 5. Apex of a branch, partially clothed with hairs. 6. A hair. 7. An articulation of the lower part of the filament:—all the latter figures *more or less highly magnified*.

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## PLATE CCCXXXV.

ENTEROMORPHA COMPRESSA, *Grev.*

GEN. CHAR. *Fronde* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*, granules, commonly in fours, contained in the cellules of the frond. ENTEROMORPHA (*Link*),—from *εντερον*, an *entail*, and *μορφη*, *form* or *appearance*.

ENTEROMORPHA *compressa*; fronds elongated, branched, cylindrical, or sub-compressed; the branches simple, or nearly so, long, obtuse, much attenuated at the base.

ENTEROMORPHA *compressa*, *Grev. Alg. Brit.* p. 180. tab. xviii. *Hook. Br. Fl.* vol. ii. p. 314. *Harv. Man.* ed. 1. p. 174. ed. 2. p. 213. *Harv. in Mack. Fl. Hib.* part 3. p. 242. *Wyatt, Alg. Danm.* No. 165. *Kütz. Sp. Alg.* p. 480.

SOLENTIA *compressa*, *Ag. Syst. Alg.* p. 186.

FISTULARIA *compressa*, *Grev. Fl. Edin.* p. 300.

ULVA *compressa*, *Linn. Fl. Suec.* p. 433. *Lightf. Fl. Scot.* vol. ii. p. 969. *Ag. Sp. Alg.* vol. i. p. 420. *Sm. E. Bot.* t. 2739.

ILEA *compressa*, *Gaill. Dict. Sc. Nat.* vol. iii. p. 373.

SCYTOSIPHON *compressus*, *Lyngb. Hyd. Dan.* p. 64. t. 15. A. B.

CONFERVA *compressa*, *Roth, Cat. Bot.* vol. i. p. 161.

HAB. On rocks, stones, and woodwork in the sea between tide-marks, in æstuaries, &c. Annual. Vegetates at all seasons. Excessively common.

GEOGR. DISTR. Generally diffused throughout temperate and tropical latitudes, in both hemispheres.

DESCR. *Root* a small disc. *Fronde*s tufted, or clothing wide spaces of rock, from an inch to six or twelve inches long or more, sometimes as fine as hair, sometimes half an inch or more in breadth, extremely variable in aspect and in ramification. The wider specimens are often but slightly branched, having a principal stem furnished with several, irregularly inserted, long and simple lateral branches; the narrower individuals are repeatedly divided; their branches bearing one or more sets of lesser branches; and other varieties have the branches, or the whole plant, clothed on all sides with slender capillary ramuli. All the branches, and their divisions, taper greatly toward the base, and the apices are generally blunt. The tube is more or less strongly compressed in most cases, but some of the wider varieties are inflated, in which case they can only be known from *E. intestinalis* by being branched. The colour is a beautifully brilliant green, and the surface glossy as silk. The substance is membranous, and adheres but imperfectly to paper.



This plant is dispersed almost over the whole explored ocean, having been brought from nearly every shore, except those few antarctic coasts where nothing marine vegetates, save *Diatomaceæ*. I have never seen a collection of Algæ, of any extent, from any part of the world, which did not contain specimens of *Enteromorpha compressa*. Though always recognizable by the character of its branches tapering toward the base, it puts on a multitude of aspects according to the situation in which it grows. Near high-water mark it forms a short, shaggy pile, of slender fronds, spreading over rocks and stones, and most treacherous to the stepping of unwary feet, being pre-eminently slippery. A little lower down, in the rock-pools, it has the appearance of the varieties figured in our plate; and where fresh-water streams flow into the sea, it becomes broader, with inflated tubes, and often of great length. Such forms closely resemble *E. intestinalis*, which, however, is never branched. Other varieties occur on floating timber, on piles exposed to the tide, and on the vertical walls of quays in tidal rivers; in fact, in nine cases out of ten, when such objects are seen clad in green, the appearance is caused by the presence of this species.

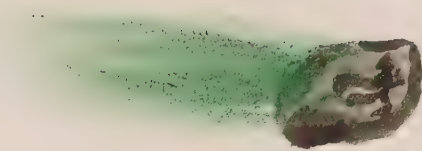
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Fig. 1. Sundry varieties of ENTEROMORPHA COMPRESSA:—*of the natural size*.  
2. A small portion of a branch magnified, to show the cellular structure.

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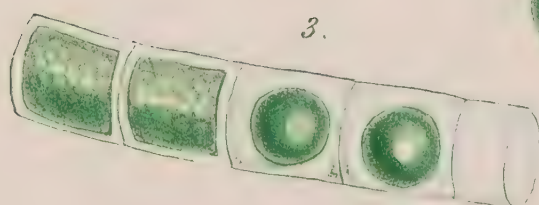




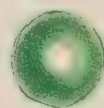
1.



2.



3.



4.

## PLATE CCCXXXVI.

## LYNGBYA (HORMOTRICHUM)

## CUTLERIÆ, n. sp.

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GEN. CHAR. *Filaments* destitute of a mucous layer, free, flexible, elongated, decumbent, not oscillating. *Tube* continuous; endochrome green or purple, densely annulated, and finally separating into lenticular sporidia. LYNGBYA (*Ag.*),—in honour of *H. C. Lyngbye*, author of an excellent work on the Algæ of Denmark.

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LYNGBYA *Cutleriæ*; filaments excessively slender, soft, articulated; articulations about as long as broad, the endochrome at length formed into a spherical sporidium.

HAB. In æstuaries. Annual. Spring and summer. Near the mouth of the Otter, Budleigh Salterton, covered every tide, *Miss Cutler* (May 1850).

GEOGR. DISTR.

DESCR. *Filaments* forming continuous tufts, excessively slender and delicate (like those of *Conferva bombycina*), soft, curved, but not twisted, articulated throughout. In an early stage the filament is confervoid, the cells, which are about as long as, or a little longer than broad, being filled with a pale green fluid endochrome. At a later period this gradually becomes granular and contracts, no longer filling the tube, and finally it is consolidated into a brilliant bead-like green sporidium. Soon afterwards, the membrane bursts, the filaments break up, and the mature fruit is dispersed in the water. *Substance* somewhat gelatinous, the plant adhering most closely to paper in drying.

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I am indebted to Miss Cutler, of Budleigh Salterton, for a specimen of the pretty little plant here figured. It has all the generic characters of Kützing's genus *Hormotrichum*, which has been already placed provisionally as a subgenus of *Lyngbya*, but it does not appear to accord specifically with any of the species described by Kützing. Believing myself, therefore, at liberty to assign a specific name to it, I wish to dedicate our new species to its discoverer, who has greatly enriched the British marine

flora with discoveries and observations, and to whom Dr. Greville has already inscribed the genus *Cutleria*.

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Fig. 1. LYNGBYA (HORMOTRICHUM) CUTLERIÆ:—*the natural size*. 2. Portions of filaments of various ages:—*magnified*. 3. A small portion of a partly mature filament; and 4, a sporidium:—*both very highly magnified*.

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## PLATE CCCXXXVII.

## GELIDIUM CARTILAGINEUM, Gaill.

GEN. CHAR. *Fronde* linear, compressed, pinnated; its *axis* composed of densely interwoven, longitudinal, tenacious fibres; the periphery of small, polygonal cells. *Fructification* of two kinds, on distinct individuals: 1, *tubercles* (*favellidia*) immersed in swollen ramuli, containing a spherical mass of oblong spores; 2, *tetraspores* contained in club-shaped ramuli, bipartite or tripartite. GELIDIUM (*Lam.*),—from *gelu*, frost, whence also *gelatine*; but none of the species of the restricted genus are gelatinous.

GELIDIUM *cartilagineum*; frond several times pinnated, pinnæ and pin-  
nulæ alternate, erecto-patent, with rounded axils, linear, obtuse;  
tubercles elliptical, mucronate, immersed in the ultimate pinnules.

GELIDIUM *cartilagineum*, Gaill. *Résum.* p. 15. *Duby, Bot. Gall.* p. 948.  
*Grev. Alg. Brit.* p. 140. *Hook. Br. Fl.* vol. ii. p. 304. *Harv. Man.* ed. 1.  
p. 81. ed. 2. p. 139. *Kütz. Phyc. Gen.* p. 406. t. 73 (*Anatomy*). *Sp.*  
*Alg.* p. 763.

GELIDIUM *concatenatum*, *Lamour. Ess.* p. 41.

GELIDIUM *versicolor*, *Lamour. Ess.* p. 41.

SPHÆROCOCCUS *cartilagineus*, *Ag. Sp. Alg.* vol. i. p. 286. *Ag. Syst.* p. 227.

FUCUS *cartilagineus*, *Linn. Sp. Pl.* p. 1630. *Gun. Fl. Norv.* p. 108. t. 3. f. 5.  
*Esper, Ic. Fuc.* t. 1. *Turn. Syn.* vol. ii. p. 284. *Turn. Hist.* t. 124. *E.*  
*Bot.* t. 1477.

FUCUS *capensis*, *Gm. Hist. Fuc.* p. 157. t. 17. f. 1.

FUCUS *versicolor*, *Gm. l. c.* p. 158. t. 17. f. 2.

HAB. Thrown ashore, occasionally, on the south coasts of England.  
Perennial. Freshwater Bay, Isle of Wight, *Dr. Withering* (*Turn.*  
*Syn. l. c.*) Picked up at Ryde, Isle of Wight, in 1849, by *Mr.*  
*Sheppard* (*Miss Gifford*, in litt.)

GEOGR. DISTR. Cape of Good Hope, and Port Natal; abundant. California.  
Canary Islands. Chinese Sea. (Adriatic, *Wulfen*. Near Nice, *Allioni*.  
Northern Ocean, as by Finmark, here and there, *Gunner*:—*fide Turn. Hist.*  
vol. ii. p. 138.)

DESCR. *Root* fibrous, matted, extensively spreading. *Fronde*s tufted, from one  
to two feet in length, linear, compressed, scarcely a line in breadth; *stem*  
undivided or once or twice forked, usually naked below, set in the upper  
half with decompoundly pinnated spreading branches. *Branches* three or  
four times pinnate, ovate in outline, the lowermost pinnæ being longest



and most compound, the upper more simple, and the ultimate ones frequently quite simple and spine-like, in which case the apex of the branch runs out in a long acumination. *Pinnæ* and *pinnulæ* linear, obtuse, inserted at wide angles or somewhat horizontal, but the apices usually curved inwards, so as to make the general direction of the ramulus erecto-patent. *Substance* cartilaginous, tough. *Colour*, when quite recent, a very dark brown-red or purplish-red, but after exposure passing through scarlet, orange, yellow, and light green, to white.

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This fine species was first introduced to the British Flora by Mr. Turner, in his *Synopsis* (1802), on the authority of specimens collected by Dr. Withering; but in the *Historia Fucorum* (1809) its British habitat is, as Dr. Greville observes, altogether omitted, and it is not alluded to in any way as a British plant. In English Botany it is retained on the authority of Dr. Withering's specimens, which are said to have been collected a short time before that author's death. The *Fucus cartilagineus* of his work (vol. iv. p. 119) has no reference to these specimens, but is merely copied from Hudson (Fl. Ang. 586), whose synonym is commonly referred to *Sphærococcus coronopifolius*.

I am indebted to Miss Gifford for a specimen, from which the figure now given has been prepared, and which forms a part of a tuft of fronds picked up on the shore near Ryde, by Mr. Sheppard. I do not, however, consider the claims of this plant to be regarded as British at all increased by the discovery of these specimens, which were probably thrown overboard from some ship at Spithead, and wafted ashore. They have all the appearance of being Cape-grown: in size and colour, and whole aspect, they are identical with the usual specimens brought by sailors from that coast. Were the plant of British growth we should expect to find some characteristic mark, or, at least, that it would be thrown up from the sea in an unbleached state. From the geographical range of this plant, it is highly improbable that it should be a native of our shores. The nearest point to our shores of any of its well-ascertained habitats, is at the Canary Islands; the Mediterranean habitats being very uncertain, and that in Finland evidently a mistake.

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Fig. 1. *GELIDIUM CARTILAGINEUM*:—*the natural size*. 2. One of the *pinnæ*:—*slightly magnified*.

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## PLATE CCCXXXVIII.

## LAMINARIA DIGITATA,

## Var. STENOPHYLLA.

*LAMINARIA digitata stenophylla*; whole plant dark brown; stipes slender, flaccid, glossy, becoming compressed or flattened upwards; lamina wedge-shaped and tapering at base, much longer than the stipe, digitate, its segments few, and very narrow.

*HAFGYGIA digitata*, var. *stenophylla*, *Kütz. Sp. Alg.* p. 577.

*LAMINARIA conica*, *Bory, Dict. Cl. d'Hist. Nat.* vol. ix. p. 190.

HAB. Common round the shores of the Orkney Islands, and the North of Ireland.

On Plate CCXXIII. I have figured a small specimen of the ordinary form of *L. digitata*, and given a detailed description of the species; and I here figure an equally small specimen of what is either a remarkable variety of that species or entitled to specific distinction. My attention was first drawn to it by my friend the *Rev. J. H. Pollexfen*, who directed me to some excellent remarks on these *Laminariæ*, furnished by *Rev. C. Clouston*, of Orkney, to 'Anderson's Guide to the Highlands and Islands of Scotland.'

The differences between these varieties are so marked, that the Orkney kelp-men have assigned peculiar local names to each, calling the ordinary *L. digitata* (Plate CCXXIII.) *Cuvy*, and the form here figured *Tangle*. I extract the following contrasted characters of each from *Mr. Clouston's* memoir:—

"*Root.* The fibres of the root of the *Cuvy* (*L. digitata vera*) are arranged in longitudinal lines or rows, not whorls; while the fibres of the *Tangle* (*L. d. stenophylla*) have no order at all. This arrangement of the fibres is particularly evident, as the plant is frequently thrown on shore, having all except the stumps worn away by friction.

"*Stipes.* The *stipes* of the *Cuvy* scarcely ever exceeds four or five feet in length, while its circumference near the root is sometimes seven inches. It is so stiff as to stand up almost perpendicular two-thirds of its height; but droops at the top from the weight of the frond. It is surrounded by a rough bark as thick as pasteboard, which may be separated from it. Colour light brown; much infested with parasitical plants, particularly the *Ptilota plumosa* and *R. palmata*, or *Dulse*. It tapers much towards the top, but retains its round figure till it spreads immediately into the frond. The lower end tastes very salt, and is not eatable. The *stipes* of the *Tangle*, on the contrary, frequently attains the length

of eight or ten feet, while its circumference seldom exceeds four inches. It is so *flexible* as to lie prostrate on the rocks; has a *smooth* polished surface, and no bark that can be separated, at least easily; *colour* very dark brown or black; rarely hurt by any parasitical plant: the top is considerably *flattened* some time before it expands into the frond, and the lower end tastes *sweet*, and is much eaten by some people.

“*Fronde*. The frond of the Cuvy is *thicker, shorter*, and the segments more numerous and *clustered*, than in the Tangle. That of the Cuvy swells into blisters by steeping in fresh water, while the frond of the Tangle bleaches white; but the great distinction in this part, and the one which makes this plant so valuable, is, that the Cuvy annually *throws off the old leaf*, and acquires a new one, while this has never been observed in the Tangle.” [Here follows an account of the shedding of the old fronds; the history then proceeds.] “The situations in which the two plants grow are also very different; the Cuvy growing so far out in the sea that the highest limit can only be approached at the lowest stream tides, and from this it runs into the ocean, as far as the eye can penetrate, and probably much farther; while the Tangle may be approached at ordinary tides, and forms a belt between the Cuvy and the beach. The general aspect also differs. The stems of the Cuvy stand up like a parcel of sticks, and the leaves wave from them like little flags; while the Tangles lie prostrate on the rocks, the leaves mingle together, and form a darker belt round the shore. Six or eight feet is reckoned a good length for a Cuvy, while Tangles may be found from twelve to twenty feet.”—*Anderson’s Guide*, ed. 1. p. 721, 722.

I can bear witness to the accuracy of most of the above observations, having had, last summer, an opportunity of seeing, in the neighbourhood of the Giants’ Causeway, both plants growing in profusion, and each retaining its peculiarities. The *Tangle* is strikingly obvious, from its dark colour, on the white limestone-rocks near Dunluce Castle, where it forms a clearly defined fringe round the bases of the cliffs. I have traced it from a few inches to many feet in length, and found it retain its form, and colour, and glossy, flaccid stipe; and so far as my opportunities of judging allow me to form an opinion, I am disposed to regard it as a *good species*. But perhaps a more careful observation, and comparison, may be necessary before this be definitively settled, and for the present I leave it as a form of *L. digitata*; recommending the varieties of that species, on all parts of the coast, to the study of observers. In drying the colour becomes olive.

In Mr. Edmondston’s ‘*Flora of Shetland*’ (p. 54), the trivial name *digitata* is applied to the plant here figured; while the ordinary *L. digitata* (or Cuvy) is called *L. Cloustoni*, Edm.

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Tab. CCCXXXVIII. A very young, and a more advanced specimen of *L. d. stenophylla*. Fig. 1. Small portion of a full-grown, compressed stipes:—all the figures *the natural size*.

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## PLATE CCCXXXIX.

LAMINARIA LONGICRURIS, *De la Pyl.*

GEN. CHAR. *Frond* stipitate, coriaceous or membranaceous, flat, undivided or irregularly cleft, ribless. *Fructification*, cloudy spots of spores, imbedded in the thickened surface of some part of the frond. LAMINARIA (*Lamour.*),—from *lamina*, a thin plate, in allusion to the flat frond.

LAMINARIA *longicruris*; stipes very long, slender at the base, hollow and inflated in the middle, and gradually tapering to the apex; frond undivided, ovato-lanceolate, membranaceous, obtuse.

LAMINARIA *longicruris*, *De la Pyl. An. Sc. Nat.* vol. iv. p. 177. t. 9. f. A. *Fl. Ter. Neuv.* p. 41. *Post. & Ruppr. Illustr.* p. 10. *J. Ag. Sp. Alg.* vol. i. p. 135. *Kütz. Sp. Alg.* p. 576. *Harv. Ner. Bor. Amer.* t. 6.

LAMINARIA *ophiura*, *Bory, Dict. Class.* vol. ix. p. 198.

HAB. Cast ashore. Island of Sanday, Orkney, *Mr. George Firth* (1838), fide *Rev. J. H. Pollexfen*. Coast at Gamnie, Banffshire, *Rev. G. Harris* (May 1850), fide *Prof. Dickie*. Ayrshire coast, *Rev. D. Landsborough* (July 1850). Near Dunluce Castle, county Antrim, *W. H. H.* (August 1850):—all the specimens much worn, and covered with barnacles.

GEOGR. DISTR. Northern Ocean, at Spitzbergen, *Vahl*. Baltic Sea, *J. Agardh*. Newfoundland (*De la Pylaie*), and common along the American shore as far south as Cape Cod, *W. H. H.* Bahama Islands, *Chauvin*. Kamtschatka, *Postells and Rupprecht*.

DESCR. *Root* of numerous, slender, and much branched clasping fibres, issuing at irregular intervals from the lower part of the stipe. *Stem* from eight to twelve feet in length, very slender at the base, and there solid, gradually widening upwards and soon becoming hollow; at length, toward the middle widened to upwards of an inch in diameter, thence tapering to the apex, and terminating in the broadly cuneate base of the lamina. *Lamina*, when full grown, six to eight feet in length and from two to three feet in width, oblong-lanceolate or oval, very much waved at the margins and obtuse at the apex, of thinner substance than in *L. saccharina*. *Colour* of the stem yellowish-brown, of the lamina a beautiful pale greenish-olive.

This is a very distinct and beautiful species, and one of the largest of the genus, the frond being frequently as large as a moderately-sized table-cloth. It abounds along the coast of

North America, as far south as Boston Bay, and is of particularly large dimensions, and in great abundance, in the deep harbour of Halifax. It would seem also, from its other recorded habitats, to be generally dispersed through the Arctic Sea. But what are its claims to a place in the British flora? At present they are extremely doubtful—all the specimens which have been found being merely the stipes, covered with barnacles, and deprived of both root and leaf. The *hollow* stipe, tapering to both ends, is, however, so remarkable that no mistake can be made in identifying the specimens. The question simply is, *where* were these specimens grown? By their colony of barnacles they must have been long adrift, and most probably they were wafted either from the shores of Greenland or the more distant American coasts, swept by the Gulf Stream. To us, therefore, they come with no better claim on our charity than the equally drifted fronds of *Sargassum*. But I am not without hope that future observations, in the bays of Shetland or Orkney, may establish a clearer title; for if *L. longicruris* be truly a native of the Baltic, as Agardh assures us, there is nothing improbable in its vegetating in our most northern bays. In general aspect it resembles *L. saccharina*, but the frond is proportionally broader and more blunt, and of thinner substance; while the very long stem, hollow and somewhat swollen in the middle, will always afford a clear mark of distinction. Our figure is taken from a specimen collected at Halifax, Nova Scotia.

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Fig. 1. LAMINARIA LONGICRURIS:—on a reduced scale, of an inch to a foot.  
2. A portion of the hollow stem:—the natural size.

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## PLATE CCCXL.

ENTEROMORPHA CLATHRATA, *Grev.*


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GEN. CHAR. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*, granules, commonly in fours, contained in the cells of the frond. ENTEROMORPHA (*Link*),—from *εντερον*, an *entrail*, and *μορφή*, *form* or *appearance*.

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ENTEROMORPHA *clathrata*; frond cylindrical, filiform, slender, highly reticulated; branches spreading, much divided, set with divaricated or recurved, slender, spine-like ramuli.

ENTEROMORPHA *clathrata*, *Grev. Alg. Brit.* p. 181 (in part). *Hook. Brit. Fl.* vol. ii. p. 315. *Wyatt, Alg. Danm.* No. 34. *Harv. Man.* ed. 1. p. 175. ed. 2. p. 214. *Kütz. Sp. Alg.* p. 479.

SOLENTIA *clathrata*, *Ag. Syst. Alg.* p. 186.

SCYTOSIPHON *clathratus*, *Lyngb. Hyd. Dan.* p. 66. t. 16.

SCYTOSIPHON *paradoxus*, *Fl. Dan.* t. 1595. f. 2.

ULVA *clathrata*, *Ag. Syn.* p. 46.

CONFERVA *clathrata*, *Roth, Cat. Bot.* vol. iii. p. 175.

CONFERVA *paradoxa*, *Dillw. Conf.* p. 70. t. F. *E. Bot.* t. 2328.

HAB. In rock-pools, between tide-marks. Annual. Spring and Summer. Not uncommon.

GEOGR. DISTR. Shores of Europe.

DESCR. *Root* a small disc. *Fronde*s densely tufted, often inextricably tangled together at the base, from six to eight inches long or more, varying in diameter from the fineness of human hair to that of stout bristles, excessively and irregularly branched; the branches issuing at all sides, of very unequal lengths, patent, and attenuated at the apex, ending in a fine point. The principal branches are furnished with a varying number of lesser divisions, and all are more or less copiously beset with short, slender, awl-shaped, simple or forked, spine-like ramuli, which stand out nearly horizontally from the branches. *Reticulations* of the membrane of large size, and somewhat quadrate. *Colour* of a fine, clear grass-green, becoming paler when dried. *Substance* soft and flaccid, membranous. In drying the plant adheres pretty firmly to paper.

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This is nearly related to *E. ramulosa*, but is of a much softer substance, usually more slender in its tube, and more repeatedly

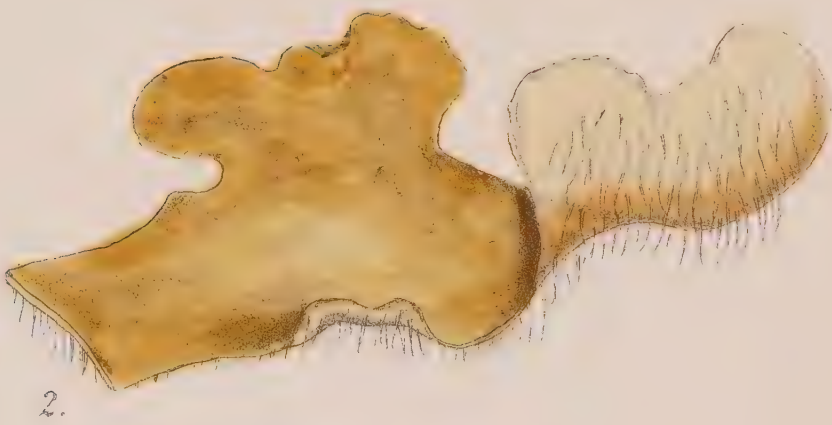
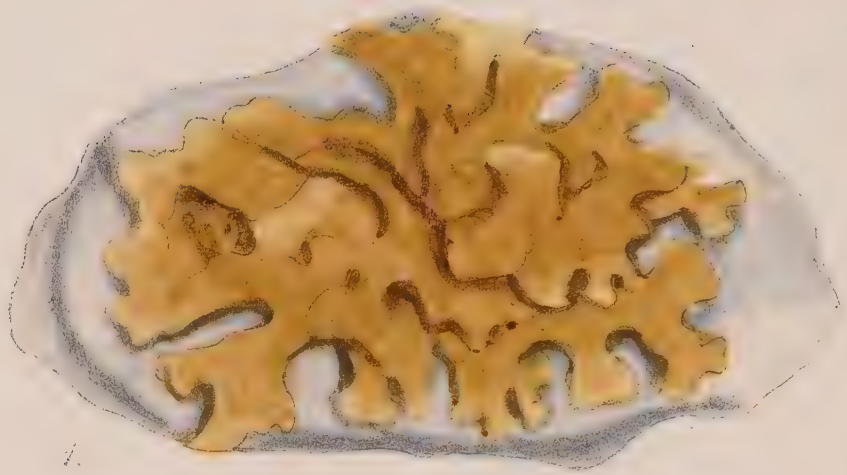
branched, so that its tufts are more bushy and feathery. It frequently lies prostrate, forming a widely spreading fleecy covering either to rocks or to mud, but this character is not very constant. To *Ent. erecta* (Plate XLIII.) it is also very closely allied, but is of less plummy habit than that species, with less difference in diameter between the main stems and branches and their lesser divisions, and the ramuli are shorter and more squarrose. Still, it must be confessed that there is a greater resemblance between these three species, in microscopic characters, than a *species-maker* would desire ; and I remain of the opinion formerly expressed, that no great violence would be done to truth by regarding them all as forms of one Protean species.

---

Fig. 1. ENTEROMORPHA CLATHRATA ;—Tuft *the natural size*. 2. Part of a branch :—*magnified*. 3. One of the ramuli :—*highly magnified*.

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## PLATE CCCXLI.

ZONARIA PARVULA, *Grev.*

GEN. CHAR. *Root* coated with woolly fibres. *Frond* flat, ribless, fan-shaped, entire or variously cleft, marked with concentric lines; the cells of the surface radiating. *Fructification*, roundish or irregular, scattered *sori*, bursting through the cuticle of both surfaces of the frond, consisting, at maturity, of numerous *spores*, nestling among jointed threads. ZONARIA (*Ag.*),—from ζώνη, a *girdle* or *zone*; because the frond is usually transversely banded.

ZONARIA *parvula*; frond procumbent, attached by fibres issuing from its lower surface, membranaceous, suborbicular, variously lobed; lobes free, rounded, scarcely marked with concentric lines.

ZONARIA *parvula*, *Grev. Crypt. Fl.* t. 360. *J. Ag. Sp. Alg.* vol. i. p. 107. *Harv. Man.* ed. 2. p. 38.

PADINA *parvula*, *Grev. Alg. Brit.* p. 63. *Hook. Br. Fl.* vol. ii. p. 282. *Harv. Man.* ed. 1. p. 31.

PADINA *reptans*, *Crouan.*

PADINELLA *parvula*, *Aresch. Pug.* vol. ii. p. 260. t. ix. f. 1-3.

AGLAIIOZONIA *parvula*, *Zanard. Sag.* p. 38. *Kütz. Sp. Alg.* p. 566.

AGLAIIOZONIA *reptans*, *Kütz. l. c.*

HAB. On stones and nullipores near low-water mark, and especially on nullipore banks in 4-15 fathoms water. Perennial? Summer. Discovered by *Miss Cutler*, on sandstone tidal rocks near Sidmouth. Miltown Malbay, near low-water mark; and Roundstone, on the nullipore bank, *W. H. H. Bute, Rev. D. Landsborough*. Probably all round the coast, in deep water.

GEOGR. DISTR. British and French Atlantic coasts. Baltic Sea. Adriatic.

DESCR. *Root*? *Fronds* procumbent, spreading over the rocks or surface of the nullipore in circular patches, like a *lichen*, closely attached by means of numerous fibrils or rootlets which issue from all parts of the lower surface; when young roundish, and slightly lobed, the lobes rounded; as the plant advances the lobes become elongate, somewhat linear, from a quarter to half an inch in width, simple or subdichotomously divided, with rounded axils; *apices* always rounded, and broader than the inferior portion of the lobe, thus affecting a fan-shaped form. *Margin* somewhat wavy, free from the rock. *Substance* membranaceous, brittle, and not adhering to paper. *Surface* reticulated with small cells, which are arranged in slightly radiating longitudinal lines, the cells at the base of the lobe being small and close-

pressed, those above them wider and longer, quadrate and nearly twice as long as broad: again, the apical cells are always short while the frond is in a growing state, as it increases by successive additions to the outer margin. *Fibrils* simple or forked, taking hold of the rock by discs at their tips.

---

This is not an uncommon plant on various parts of our coast, though frequently overlooked, owing to its hiding in crevices, or creeping through the much-branched stony nullipores. When occurring on rocks near low-water mark it is broader, less branched, and of paler colour than when dredged from deeper water. I am not able to detect satisfactory characters by which to separate the *Padina reptans* of Crouan, for specimens of which I am indebted to M. Lenormand.

No one, in this country, has met with fructification, which seems only to have been found by Dr. Areschoug, in Sweden. He finds spores collected in undefined largish sori, near the base of the frond.

---

Fig. 1. ZONARIA PARVULA :—*the natural size*. 2. Part of a frond :—*magnified*.  
3. Small portion of a lobe, to show the longitudinal, radiating lines of cells.  
4. A small part of the same, with undeveloped apical cells :—*highly magnified*. 5. Fibrils :—*highly magnified*.

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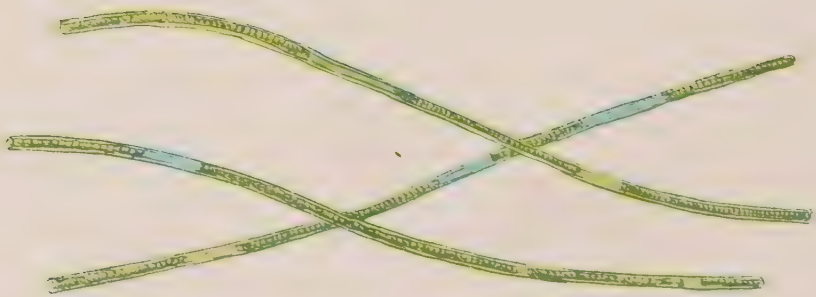




2.



1.



3.



## PLATE CCCXLII.

CALOTHRIX LUTEOLA, *Grev.*

GEN. CHAR. *Filaments* destitute of a mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolved into lenticular sporidia. CALOTHRIX (*Ag.*),—from *καλος*, *beautiful*, and *θηξ*, a *hair*.

CALOTHRIX *luteola*; filaments scattered, exceedingly minute and slender, filiform, flexible, obtuse, hyaline and pale yellowish, or containing an opake light green, interrupted, faintly annulated endochrome.

CALOTHRIX *luteola*, *Grev. Crypt. Fl.* t. 299. *Harv. in Hook. Br. Fl.* vol. ii. p. 367. *Harv. Man.* ed. 1. p. 157. ed. 2. p. 224.

CALOTHRIX *melaleuca*, *Carm. Alg. Appin. MSS.*

LEIBLEINIA *luteola*, *Kütz. Sp. Alg.* p. 276.

HAB. On marine, filiform Algæ, in tide-pools. Appin, *Capt. Carmichael*.

GEOGR. DISTR. —? Helgoland, *Kütz.*

DESCR. *Filaments* of microscopic size, visible to the eye as a minute byssoid coating to small Algæ, when seen under water, but invisible when the affected plant is lifted into the air; scattered, each thread standing apart, of equal diameter throughout, obtuse, very slender, flexible, quite simple, either hyaline and pale yellowish, or more or less filled with an opake, annulated, light-green mass. The whole plant is so minute that it requires the highest powers of a compound microscope to make out its structure.

Our figure has unfortunately been printed in too green an ink, and is less characteristic than I could wish; and will not bear a favourable comparison with the beautiful figure given by Dr. Greville. In one respect, however, I am unable to see this microscopic plant either as Dr. Greville or as Capt. Carmichael has described it, and yet we have all three had the same specimens before us. By Carmichael, its discoverer, it is thus described:—" *Filaments* in small tufts, a line or two in length, exceedingly slender, tortuous, tapering, *of a snow-white colour*, and so *opake* as to appear intensely black when viewed against

the light." The *same specimens* are described by Greville thus :—" Filaments *hyaline, yellowish*, exceedingly slender, elongated, flexible, scattered," "neither fasciculate nor tufted." Thus what Carmichael sees *opaque* and *snow-white*, Dr. Greville describes as *hyaline* and *yellowish*. If we further contrast the words of the several descriptions, other as striking discrepancies will be seen. So that, had I not received authentic specimens of the original plant, named by Carmichael himself, I should not have hesitated to regard his description as drawn from another species; I can now only attribute the differences to a defective microscope. It should be stated, however, that I have only seen this plant in a dried state, when its colour may have altered from *white* to *green*. Under the higher powers of the microscope the *green* endochrome (of the dried specimen) is very obvious; the "yellow and hyaline" character mentioned by Greville, has reference to the empty tube, from which the colouring matter has been discharged. I have only seen Carmichael's specimen, but as he found it abundantly at Appin, it is probably still to be met with on that coast, and is worth looking after.

---

Fig. 1. Small fragment of ENTEROMORPHA CLATHRATA, with CALOTHRIX LUTEOLA infesting it:—*the natural size*. 2. The same:—*highly magnified*. 3. Portions of threads of the *Calothrix*:—*more highly magnified*.

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## PLATE CCCXLIII.

SARGASSUM VULGARE, *Ag.*

GEN. CHAR. *Frond* furnished with distinct, stalked, nerved leaves, and simple, axillary, stalked air-vessels. *Receptacles* small, linear, tuberculated, mostly in axillary clusters, cellular, pierced by numerous pores, which communicate with immersed, spherical *conceptacles*, containing parietal *spores* and tufted *antheridia*. SARGASSUM (*Rumph.*),—a word formed from the Spanish *sargazo*, the name given by navigators to floating Sea-weed.

SARGASSUM *vulgare*; stem filiform, smooth, alternately branched; leaves linear-lanceolate or oblong-lanceolate (very variable in breadth), serrated, strongly ribbed, copiously glandular; air-vessels on compressed stalks about their own length, spherical, pointless; receptacles axillary, dichotomous, tuberculose, unarmed.

SARGASSUM *vulgare*, *Ag. Sp. Alg.* vol. i. p. 3. *Ag. Syst.* p. 293. *Grev. Alg. Brit.* p. 2. t. 2. *Hook. Br. Fl.* vol. ii. p. 264. *Harv. Man.* ed. 1. p. 17. ed. 2. p. 15. *J. Ag. Sp. Alg.* p. 342.

FUCUS *natans* (in part), *Turn. Hist.* t. 46. *Syn.* p. 48. *Sm. Eng. Bot.* t. 2114.

HAB. Cast ashore, drifted by oceanic currents from warmer latitudes. Cast on the shores of the Orkney Isles, *Dr. P. Neill*. (Near Falmouth? *Hudson.*)

GEOGR. DISTR. Atlantic Ocean, abundant on tropical and subtropical coasts. Shores of North America, as far north as Long Island Sound. Coasts of Spain and Portugal.

DESCR. *Root* a conical disc. *Fronds* tufted, from one to three feet in length, having a leading, mostly undivided, stem set throughout with alternate, spreading branches, the lowest of which are longest. *Stem* and branches narrow, filiform or subcompressed, smooth (destitute of rough points), somewhat flexuous. *Leaves* coriaceous, an inch or two in length, from a quarter to half an inch in breadth, oblong or linear-lanceolate, sharply serrated, the surface dotted over with muciferous pores or glands, strongly nerved. *Air-vessels* spherical, about as large as a pea, pointless, borne on compressed stalks about as long as themselves, and springing from the lower part of the petiole of the leaves. *Receptacles* in dichotomous cymoid tufts, springing with the air-vessels from the petioles, cylindrical, tuberculated, usually much shorter than the subtending leaf, sometimes elongated and filiform, and many times forked. *Colour* a foxy olive. *Substance* opake and tough.

One of the stray waifs of tropical climes, which are occa-

sionally brought to our shores by the great north-eastern current of the Atlantic, and which have no proper claim to admission into our Flora. Though the present species has had a place in British works for nearly a century, I have never seen a (so called) British specimen, and have made my figure from an American example.

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Fig. 1. Branch of SARGASSUM VULGARE:—*the natural size*. 2. A leaf, with *vesicls* and receptacles. 3. A broader leaf:—*the two last somewhat magnified*.

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## PLATE CCCXLIV.

ENTEROMORPHA LINKIANA, *Grev.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*, granules, contained in the cells of the membrane. ENTEROMORPHA (*Link*),—from *εντερον*, an *entail*, and *μορφη*, *form* or *appearance*.

ENTEROMORPHA *Linkiana*; “fronds cylindrical, tubular, filiform, reticulated, pellucid, of a very pale green colour, membranaceous (rigid when dry), much branched; branches attenuate.”—*Grev.*

ENTEROMORPHA *Linkiana*, *Grev. Alg. Brit.* p. 182. *Hook. Br. Fl.* vol. ii. p. 314. *Harv. Man.* ed. 1. p. 174. ed. 2. p. 213. *Kütz. Sp. Alg.* p. 481.

HAB. Between tide-marks. Annual. Summer. At Appin, *Captain Carmichael*.

GEOGR. DISTR. — ?

DESCR. “*Root* a minute disc. *Frond* six to twelve inches in length, filiform, cylindrical, tubular, inflated, rising with a main stem about one line in diameter, on all sides of which, and along the whole length, the branches are inserted; branches two to six inches long, smaller in diameter than the stem, between erect and spreading, set with a second series one or two inches long, which, in their turn, bear a third, which are quite capillary, all of them much attenuated toward the extremity. The *structure* distinctly reticulated, the reticulations roundish, but angular. *Fructification*, three or four subglobose granules within many of the reticulations. *Substance* membranaceous, but firm and somewhat cartilaginous when dry, adhering very imperfectly to paper. *Colour* a very pale, yellowish green.”—*Grev. l. c.* (I do not find more than *one* granule in each fertile cell, but three or four fertile cells generally cluster together.)

I prefer copying the above description from Dr. Greville's work, because my knowledge of this species (or form) is limited to a single specimen collected by Capt. Carmichael, and now preserved in the Dublin University Herbarium. From this specimen the figure has been taken. It will be seen that while the external habit is peculiar, the microscopic characters are very similar to those of *E. clathrata*, *E. erecta*, and *E. ramulosa*. Dr. Greville lays stress on the rigidity of substance, which is very observable in the dry state at least. The branches are of

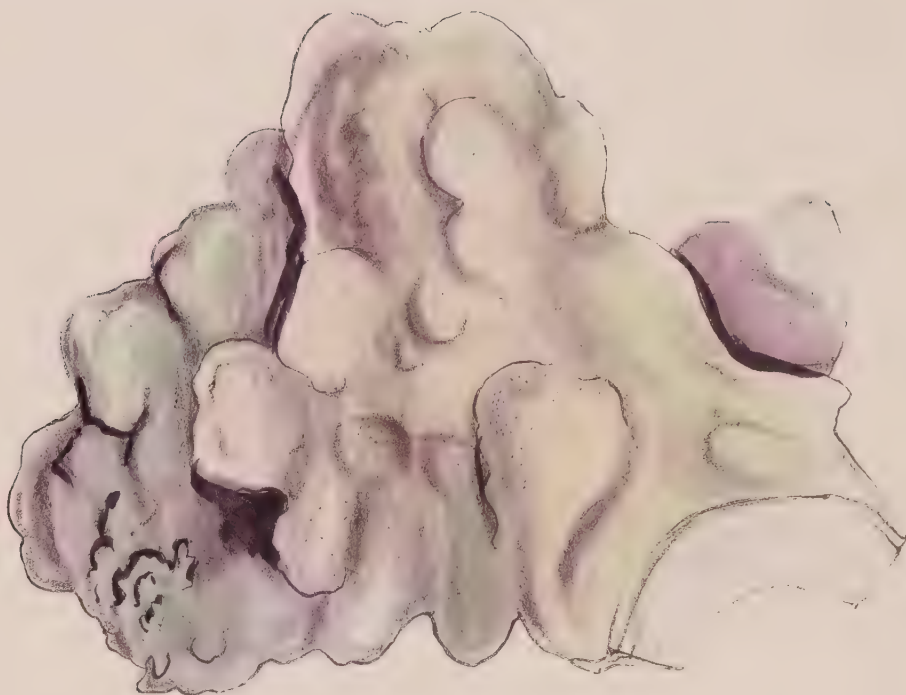
larger diameter than is common in *E. clathrata*, but this is a character of little moment in this genus, and the very pale colour may arise from the peculiar circumstance under which the plant grew :—as, if the specimens were collected in a shallow pool near high-water mark they would assuredly be pale. In such circumstances any species of the genus would be equally bleached.

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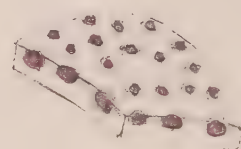
Fig. 1. ENTEROMORPHA LINKIANA :—*the natural size*. 2. Part of a branch and ramuli :—*magnified*. 3. Small fragment of the membrane, with fertile cells :—*highly magnified*.

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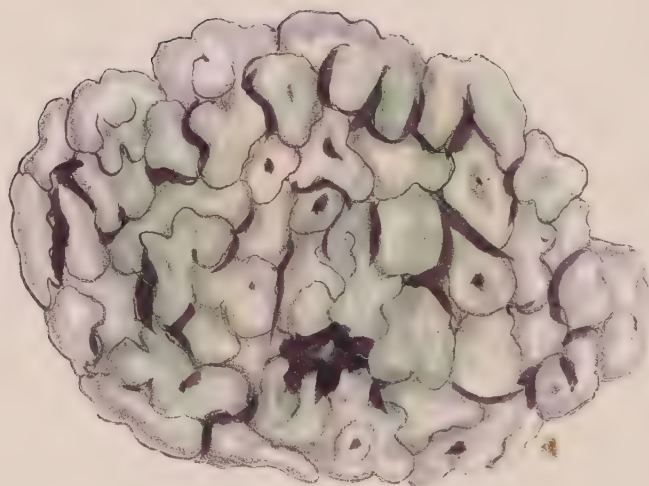




1.



3.



2.



4.



5.



## PLATE CCCXLV.

MELOBESIA POLYMORPHA, *Linn.* (sp.)

GEN. CHAR. *Frond* attached or free, either flattened, orbicular, sinuated or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*: conical, sessile *ceramidia*, scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores*.—Named from one of the Sea-nymphs of Hesiod.

MELOBESIA *polymorpha*; frond attached to rocks, thick, stony, encrusting, or rising into short, clumsy branches, which are seldom much divided, and often merely rudimentary; *ceramidia* minute, depressed, extremely numerous.

MELOBESIA *polymorpha*, *Harv. Man.* ed. 2. p. 108.

MILLEPORA *polymorpha*, *Linn. Syst. Nat.* 1285. *Ellis and Soland. Zoop.* 130.

NULLIPORA *polymorpha*, *Johnst. Brit. Lith.* p. 238. t. 24. f. 1, 2, 3 (?), and t. 25. f. 23. (in part.)

SPONGITES *polymorpha*, *Kütz. Sp. Alg.* p. 699.

CORALLIUM *cretaceum lichenoides*, *Ellis, Cor.* p. 76. t. 27. fig. d. D. (*sic* fig.)

HAB. On littoral rocks all round the coast, extending beyond low-water mark. Common.

GEOGR. DISTR. (*Probably widely dispersed.*)

DESCR. *Frond* at first appearing on the surface of rocks, pebbles, or shells, in the form of little stony pimples, which gradually become confluent, so as to form an uneven crust, resembling one of the crustaceous *Lichens*, and spreading over indefinite spaces. This crust gradually grows thicker by successive thin coats of cellular and calcareous substance formed and deposited on the surface, and is very irregular in form; sometimes continuing nearly flat, sometimes rising into irregular stony knobs or lumpy masses, and sometimes throwing up short, erect, scarcely divided branches. *Ceramidia* minute, dot-like, sunk deeply in the outer layer of cells, extremely numerous and often puncturing over the whole surface of fertile fronds as if they had been closely marked with pin-holes. *Colour* variable according to the locality, dark lurid purple near low-water mark, and passing into chalky-white as the specimens grow nearer high-water mark. *Cells* of which the frond is composed about twice as long as their diameter. *Substance* stony.

To this form I refer most of the lumpy *Nullipores*, with thick

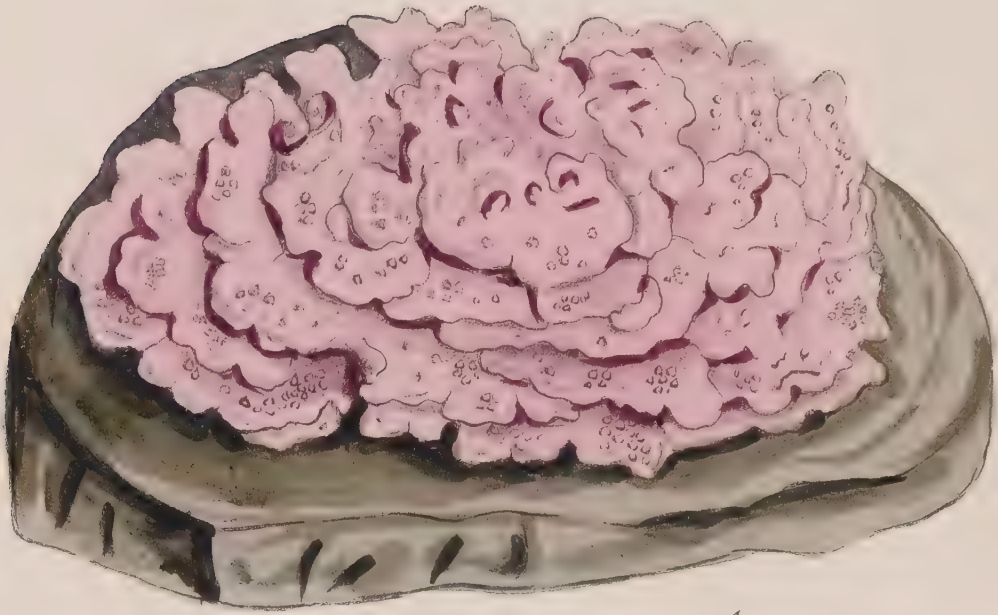
stony fronds, and of various uncertain shapes, found encrusting tidal rocks, and occasionally thrown up or dredged from deeper water. Dr. Johnston's figures, at Plate XXIV. 1, 2, 3, of his 'History of British Sponges and Lithophytes,' represent a form which abounds in Dalkey Sound, near Dublin, and on which the late Mr. M'Calla founded a species which he called *Nullipora compressa*. It perhaps ought to receive a specific name, but, if left unennobled, it seems to me rather to fall, as a variety, under *M. calcarea*, than under the present species.

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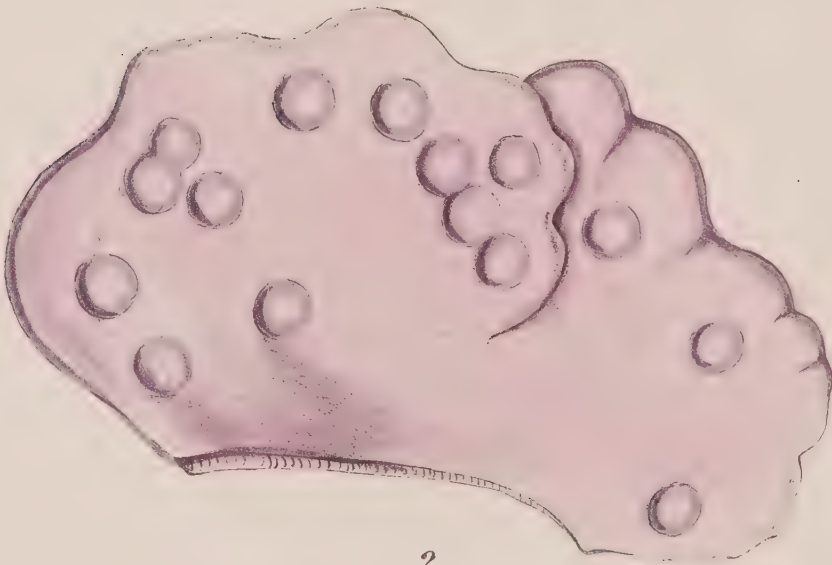
Fig. 1 and 2, different specimens of MELOBESIA POLYMORPHA:—*the natural size*. 3. Small portion of a fertile frond, showing the ceramidia. 4. Vertical section of the frond, to show arrangement of cellular coats:—*both magnified*. 5. Cellular structure:—*highly magnified*.

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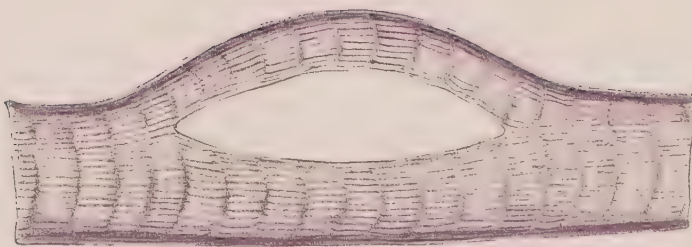




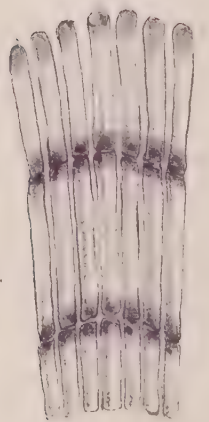
1.



2.



3.



4.



## PLATE CCCXLVI.

MELOBESIA LICHENOIDES, *Borl.* (sp.)

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GEN. CHAR. *Frond* attached or free, either flattened, orbicular, sinuated or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*: conical, sessile *ceramidia*, scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores*.—Named from one of the Sea-nymphs of Hesiod.

---

MELOBESIA *lichenoides*; frond attached to rocks, free at the margins, foliaceous, lichen-like, variously lobed; foliations spreading, often imbricated; *ceramidia* large, conical, prominent.

MELOBESIA *lichenoides*, *Harv. Man.* ed. 2. p. 109.

MILLEPORA *lichenoides*, *Borl. Cornw.* p. 239. pl. 24. f. 2, 3, 5. *Soland. Zoop.* p. 131. pl. 23. f. 10, 12.

HAB. On rocks and in tide-pools near low-water mark. Coast of Cornwall, *Rev. Dr. Borlase*. West of Ireland, abundant on the coasts of Galway and Clare, *W. H. H.* Coast of Cork, *Dr. Allman*. (Probably common on the W. and S. W. shores.)

GEOGR. DISTR. ?

DESCR. *Frond* thin and foliaceous, stony, spreading over rocks and stones in somewhat circular patches; not attached at the margins, and frequently but imperfectly attached in the centre. Many fronds grow together in the same patch, and their margins, which are much lobed and somewhat crenate, lie one over another. The lobes commonly extend in a horizontal direction, but sometimes stand erect; the habit varying greatly according to the place where the plant grows. *Ceramidia* large, prominent, obtusely conical, scattered, or collected in groups. *Cells* of which the substance is composed many times longer than their diameter. When the lime has been removed by acid, a thin slice shows a beautifully zoned structure under the microscope. *Colour* varying from dark lurid purple (in deep water) to creamy white near high-water mark. *Substance* thin and brittle.

---

This is by much the prettiest and most plant-like of the tidal *Nullipores*, strongly resembling in form and general habit one of the foliaceous lichens of the genus *Parmelia*, but differing in being of a stony substance;—thin however as paper, and very brittle. It is closely related to *M. agariciformis*, figured in one of our early numbers, from which it differs more in general

habit than by any precise character ; that species growing in globose masses, which are unattached, and lie, subject to the drifting of the waves, on the sea-bottom.

*Mastophora licheniformis*, Dcne., which Kützing refers to the plant now figured, is very different in many ways, generically and specifically.

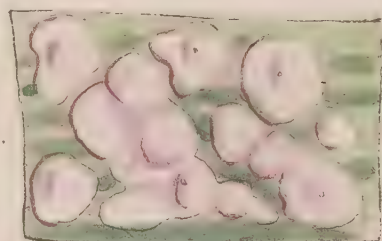
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Fig. 1. MELOBESIA LICHENOIDES; growing on a piece of rock :—*the natural size*. 2. Portion of a frond :—*magnified*. 3. Vertical section through an (*empty*) ceramidium :—*magnified*. 4. Portion of the cellular substance :—*highly magnified*.

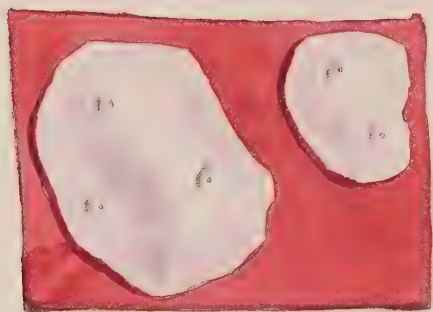
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A.



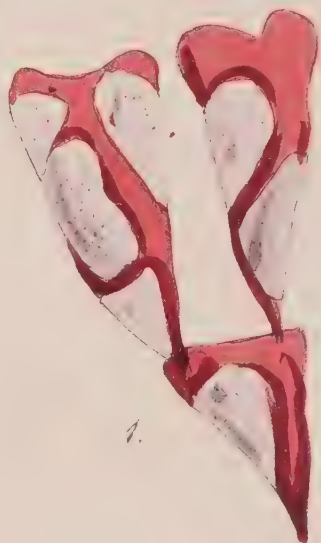
B.



D.



1.



2.

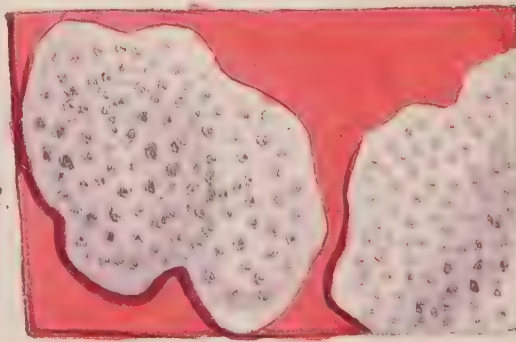




PLATE CCCXLVII. *A*.

MELOBESIA MEMBRANACEA, *Lamour*.

GEN. CHAR. *Fronde* attached or free, either flattened, orbicular, sinuated or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*: conical, sessile *ceramidia*, scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores*.—Named from one of the Sea-nymphs of Hesiod.

MELOBESIA *membranacea*; minute, dot-like, very thin, pale purple, circular, at length confluent, attached to other Algæ; *ceramidia* one or two, depressed.

MELOBESIA *membranacea*, *Lamour. Cor. Flex.* p. 315. pl. 12. f. 2, 3. *Harv. Man.* ed. 2. p. 109.

HAB. Common on the leaves of *Zostera*, the fronds of *Chondrus crispus*, &c. All round the coast.

GEOGR. DISTR. Atlantic and Mediterranean coasts of Europe.

DESCR. *Fronde* from half a line to a line in diameter, very thin and filmy, circular at first, then, from several becoming confluent, more or less lobed or irregular. *Ceramidia* one or two, depressed.

*A*. Fig. 1. MELOBESIA MEMBRANACEA, growing on a leaf of *Zostera*:—the natural size. 2. A portion magnified.

PLATE CCCXLVII. *B*.

MELOBESIA FARINOSA, *Lamour*.

MELOBESIA *farinosa*; minute, irregular in outline, rather thin, pallid, with two or three prominent *ceramidia*.

MELOBESIA *farinosa*, *Lamour. Cor. Flex.* p. 315. pl. 12. *Harv. Man.* ed. 2. p. 109. *Kütz. Sp. Alg.* p. 696.

HAB. On various Algæ.

DESCR. Rather larger and thicker than the preceding, with more prominent fruit. In other respects similar.

*B*. Fig. 1. MELOBESIA FARINOSA, growing on *Phyllophora rubens*:—natural size. 2. A portion magnified.

PLATE CCCXLVII. C.

MELOBESIA VERRUCATA, *Lamour.*

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MELOBESIA *verrucata*; thin, expanded, irregularly lobed, pallid, dotted over with innumerable, small, pimply ceramidia.

HAB. With the preceding.

DESCR. *Patches* from a quarter to half an inch in length, oblong, variously lobed at the margin, uneven. *Ceramidia* very numerous, minute.

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C. Fig. 1. MELOBESIA VERRUCATA :—*natural size.* 2. A portion *magnified.*

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PLATE CCCXLVII. D.

MELOBESIA PUSTULATA, *Lamour.*

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MELOBESIA *pustulata*; thick, dull purple or green, oblong or lobed, incrusting, smooth; ceramidia numerous, large, rather prominent, conical.

MELOBESIA *pustulata*, *Lamour. Cor. Flex.* pl. 12. f. 2. a. B. *Kütz. Sp. Alg.* p. 696. *Harv. Man.* ed. 2. p. 109.

HAB. On *Phyllophora rubens* and other Algæ; common.

DESCR. *Patches* often an inch or more in length, and half an inch broad, thickish, of irregular form, frequently lobed, closely adhering to flat surfaces or clasping cylindrical stems, the surface more or less uneven. *Ceramidia* several on each patch, clustered, of large size in proportion to those of other allied species, prominent, conical. *Colour*, when well grown, a dark, reddish purple, changing to green and finally to white.

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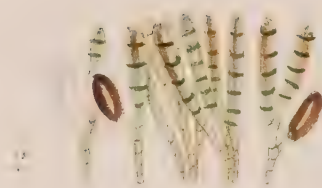
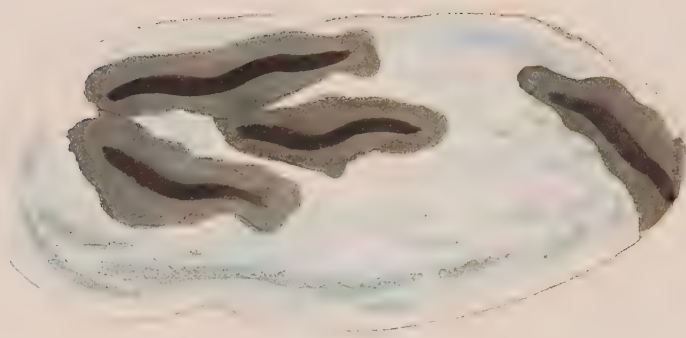
D. Fig. 1. MELOBESIA PUSTULATA :—*natural size.* 2. A portion *magnified.*

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I have thought it best to figure these four reputed species on one plate, that the slight differences noticed between them may be seen.

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## PLATE CCCXLVIII.

MYRIONEMA CLAVATUM, *Carm.* (sp.)

GEN. CHAR. *Minute* parasites, consisting of a mass of short, erect, simple, jointed filaments, which spring from a thin expansion formed of decumbent, cohering filaments, spreading in patches on the surface of other Algæ. *Spores* oblong, affixed either to the erect or to the decumbent filaments. MYRIONEMA (*Grev.*),—from *μυριος*, *numberless*, and *νημα*, a *thread*.

MYRIONEMA *clavatum*; “very minute, rather convex; filaments clavate, mostly bifid; spores obovate, pedicellate, affixed to the filaments.”

MYRIONEMA *clavatum*, *Harv. in Hook. Br. Fl.* vol. ii. p. 391. *Harv. Man.* ed. 2. p. 51. *Kütz. Sp. Alg.* p. 540.

LINCKIA *clavata*, *Carm. Alg. App. ined. cum Ic.*

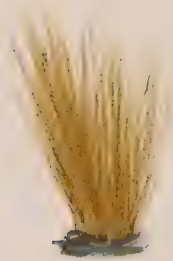
HAB. On a thin purple cartilaginous crust, probably a *Verrucaria*, which covers the pebbles at the half-tide level. Autumn. Appin, *Capt. Carmichael*, who adds, “The parasite is so much of the colour of the crust, it requires a microscope to detect it.”

Of this curious little parasite I know nothing more than is learned from the above short description, which, with the two upper figures of our plate, is copied from Capt. Carmichael's manuscripts. The lower figure is added as an enlarged representation of a portion of the middle figure. I am indebted to the Rev. M. J. Berkeley for a sketch, copied from the original by Carmichael.

Fig. 1. MYRIONEMA CLAVATUM, growing on a dark-coloured crust, upon a quartz pebble:—*the natural size*. 2. The *Myrionema* filaments:—*magnified*. 3. A barren and fertile filament:—*more highly magnified*.









## PLATE CCCXLIX.

SPHACELARIA RACEMOSA, *Grev.*

GEN. CHAR. *Filaments* jointed, rigid, distichously branched, pinnated; rarely simple or subdichotomous. *Apices* of the branches distended, membranous, containing a dark, granular mass. *Fructification*, elliptical *utricles* (or *spores*), borne on the ramuli. SPHACELARIA (Lyngb.), —from σφακελος, *gangrene*, alluding to the withered tips of the branches.

SPHACELARIA *racemosa*; “an inch in height, tufted, olivaceous, somewhat rigid, the fronds dichotomous; articulations equal in length and breadth; capsules oval, racemose, pedunculate.” *Grev.*

SPHACELARIA *racemosa*, *Grev. Scot. Crypt. Fl.* vol. ii. t. 96. *Grev. Fl. Edin.* p. 314. *Harv. in Hook. Br. Fl.* vol. ii. p. 325. *Harv. Man.* ed. 1. p. 39. ed. 2. p. 57. *J. Ag. Sp. Alg.* vol. i. p. 31. *Kütz. Sp. Alg.* p. 466.

HAB. In tide-pools? Very rare. Frith of Forth, opposite to Caroline Park, *Sir John Richardson*.

GEOGR. DISTR. Only found in the above locality, and there only once (about the year 1821).

DESCR. “*Plant* tufted, about an inch in height, of an olive-green or olive-brown colour. *Frond* filiform, somewhat rigid, 3–4 times dichotomous, the dichotomies acute. *Articulations* equal in length and breadth, diaphanous to the base. *Summits* of the branches not sphacelated in my specimens, but somewhat dilated and hyaline, as in many other species previous to the sphacelation making its appearance. *Fructification*, oval capsules, surrounded by a very narrow pellucid border, pedicellate, and arranged in a racemose manner, on a common jointed peduncle. *Racemes* suberect, arising from various parts of the frond.”—*Grev. Scot. Crypt. l. c.*

In this species we have the remarkable fact, occasionally met with in all departments of natural history, of a species distinguished by strongly marked characters having been seen but once, and that in very small quantity. The tuft from which Dr. Greville's figure, and the above description, which I have transferred from his work, were taken, has also served me in making the drawing for the plate now given, having been kindly placed in my hands for that purpose by Dr. Greville, with the liberal per-

mission to abstract a fragment of the precious relic, to be preserved in the Dublin Herbarium. The singular grape-like fructification at once marks the species, and on the specimen found almost every thread had more or less numerous clusters. So that it fortunately happens, that a small specimen of this rarity is as characteristic as a much larger would be,—no small advantage, when a half-crown would cover all the specimens at present known to botanists. Dr. Greville has repeatedly sought it in vain in the spot on which the solitary tuft was picked up by Sir J. Richardson, previous to his first and memorable Arctic Voyage.

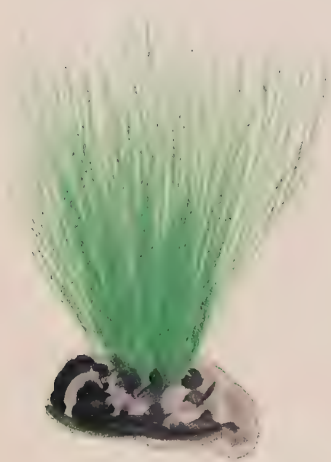
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Fig. 1. Tuft of SPHACELARIA RACEMOSA :—*the natural size*. 2. Upper portion of a frond :—*magnified*. 3. Apex of a branch, with branches of spores ; and 4, one of the pedicellate spores :—*more highly magnified*.

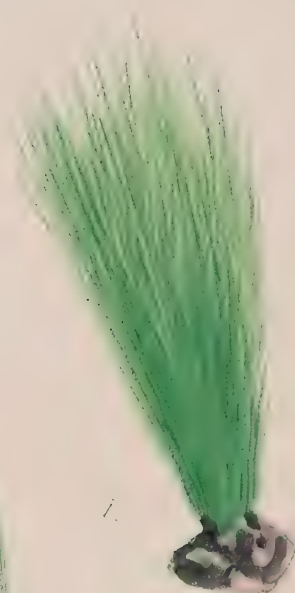
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A.



B.



3.



2.



## PLATE CCCL. A.

VAUCHERIA MARINA, *Lyngb.*

GEN. CHAR. *Fronds* aggregated, tubular, continuous, capillary, coloured by an internal, green, pulverulent mass. *Fructification*, dark green, homogeneous *sporangia* (*coniocystæ*), attached to the frond.—*Grev.*—VAUCHERIA (DC.),—in honour of *M. Vaucher*, a distinguished Swiss writer upon fresh-water *Confervæ*, &c.

VAUCHERIA *marina*; filaments loosely tufted, or distinct; branches few, very long, obtuse; sporangia solitary, obovate, pedicellate, lateral. *Carm.*

VAUCHERIA *marina*, *Lyngb. Hyd. Dan.* p. 79. t. 22. *Hook. Br. Fl.* vol. ii. p. 319. *Harv. Man.* ed. 1. p. 14. ed. 2. p. 195. *Wyatt, Alg. Danm.* no. 168(?).

HAB. On sea-plants, mud, &c., between tide-marks. Annual. Summer. At Appin, on *Furcellaria fastigiata*, *Capt. Carmichael*. On mud at Torbay and Salcombe, *Mrs. Griffiths* and *Mrs. Wyatt*.

GEOGR. DISTR. Færroe Islands, *Lyngb.*

DESCR. *Fronds* forming more or less dense erect tufts one or two inches in height, very slender and flaccid, irregularly branched, somewhat dichotomous; branches few, erect, their granular contents sometimes interrupted at long interspaces. *Sporangia* few, scattered, broadly obovate or pear-shaped, very obtuse, tapering to the base into a short stalk. *Colour* a bright grass-green, becoming rather brownish, but retaining a gloss in drying.

Not being able to prepare a satisfactory figure of this plant from dried specimens, and not having access to recent ones, I have copied, from the work of Lyngbye, a portion of his figure representing the magnified appearance of a branch in fruit. I regret that I was not earlier aware that a figure of his *V. marina* existed among the manuscript papers of the late Capt. Carmichael; a fact communicated to me since the plate was engraved and printed. Had I known it in time I should naturally have preferred publishing his drawing made from British specimens, to copying the published plate of a foreign author.

A. Fig. 1. Tuft of VAUCHERIA MARINA:—the natural size. 2. A portion of a filament in fruit:—magnified; copied from *Lyngbye*.

PLATE CCCL. B.

VAUCHERIA SUBMARINA, *Berk.*

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VAUCHERIA *submarina*; "forked fastigiate threads; coniocystæ (sporangia) numerous, lanceolate and ovate, confined to the upper branches."  
*Berkeley.*

VAUCHERIA *submarina*, *Berk. Gl. Br. Alg.* p. 24. t. 8. *Hook. Br. Fl.* vol. ii. p. 319. *Hook. Man.* ed. 1. p. 147. ed. 2. p. 195.

VAUCHERIA *dichotoma*,  $\beta$ . *submarina*, *Ag. Syst. Alg.* p. 171. *Sp. Alg.* vol. i. p. 460. *Lyngb. Hyd. Dan.* p. 76. t. 20. A. *Grev. Alg. Brit.* p. 190.

HAB. On the muddy sea-shore. Weymouth, *Rev. M. J. Berkeley.*

GEOGR. DISTR. North Sea.

DESCR. "*Plant* growing in dense fastigiate masses in muddy spots covered by the sea every tide. Threads far slenderer than in *Vaucheria dichotoma*, stained below by the mud, above dark green, forked; the branchlets generally somewhat strangulated just above their insertion; the main stem clothed, above the part where the branchlet is given off, with numerous, almost sessile, more or less ovate or lanceolate coniocystæ, which are pointed, at first entirely green, but eventually with a pellucid border. One single instance occurred, in which the *fruit* consisted of two, placed end to end."

*Berk. l. c.*

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I am only acquainted with this species through Mr. Berkeley's description and figure, both of which I have here, with his permission, made use of.

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B. Fig. 1. Tuft of VAUCHERIA SUBMARINA:—*the natural size.* 2. Filaments in fruit:—*magnified.* 3. A portion of a filament with sporangia:—*more highly magnified*; both copied from Mr. Berkeley's plate.

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PLATE CCCLI.

CLADOPHORA NUDA, *Harv.*

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz*),—from κλαδος, a *branch*, and φορεω, to *bear*.

CLADOPHORA *nuda*; filaments somewhat rigid, slender, very straight, dull-green, or olivaceous (when dry), sparingly dichotomous; ramuli few and scattered, appressed, the uppermost often opposite; articulations many times longer than broad.

CLADOPHORA *nuda*, *Harv. Man.* ed. 2. p. 101.

CONFERVA *nuda*, *Harv. in Mack. Fl. Hib.* part 3. p. 229. *Harv. Man.* ed. 1. p. 136.

HAB. On basalt rocks, between tide-marks. At Port Stewart, co. Antrim, *Mr. D. Moore*.

GEOGR. DISTR. — ?

DESCR. *Filaments* loosely tufted, two or three inches high, capillary, sparingly branched, very straight, irregularly forked or sub-alternately divided; secondary branches distant and very erect, of various lengths, naked, or furnished with a few very erect or appressed, short ramuli, the upper ones of which are occasionally opposite. These ramuli are scarcely more slender than the other parts of the frond, and end in a bluntish point. The *articulations*, in the older parts, are many times longer than their breadth, and have thick walls, leaving a wide space surrounding the dull-green endochrome; the dissepiments are slightly contracted. The substance is rather rigid, and without gloss; and in drying the plant does not adhere to paper.

My knowledge of this species, if the plant here figured be entitled to rank as a species, is confined to a specimen collected by Mr. Moore, many years ago, on the coast of Antrim, and now preserved in the Dublin University Herbarium. It is undoubtedly nearly related to *C. rupestris*, from which, at first sight, it differs by its duller colour and more naked branches, and especially by the much longer articulations of the stem, and the wider borders of the tube. Still, I fear this character of long

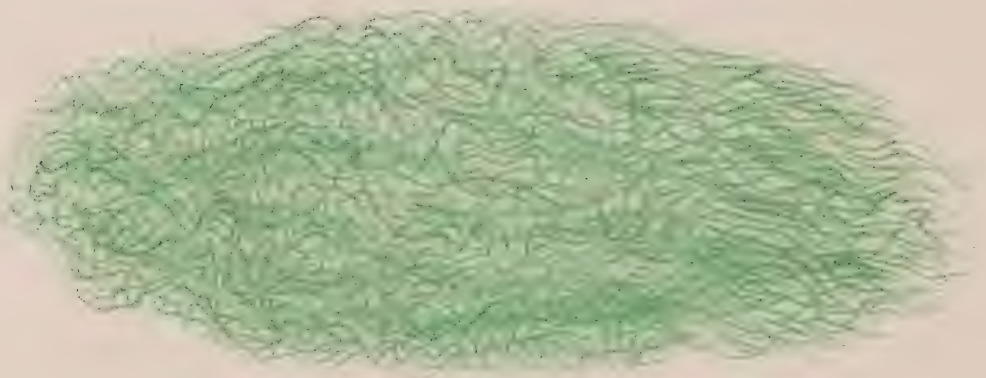
joints, which is the strongest of those mentioned, is not to be altogether counted on ; for though I have not observed the joints in any specimen of *C. rupestris* to be of the extreme length of those of *C. nuda*, yet I have seen a tendency in some specimens of that species to produce long joints ; and this, joined to the non-occurrence in recent times of *C. nuda*, has latterly disposed me to consider it a variety of *C. rupestris*. As, however, it has already obtained publicity both in this country and on the Continent, I think it deserving of being figured in this work, and shall be happy to find that future researches prove its title to receive a name. Last summer (1850) I sought for it diligently on the basaltic rocks in the neighbourhood of the Giant's Causeway, but in vain ; and it was out of my power to extend the exploration as far as Port Stewart.

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Fig. 1. CLADOPHORA NUDA :—*the natural size*. 2. Portion of a branch :—*magnified*. 3. Ramuli :—*more highly magnified*.

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## PLATE CCCLII.

ENTEROMORPHA PERCURSA, *Hook.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*: granules, commonly in fours, contained in the cells of the frond. ENTEROMORPHA (*Link*),—from *εντερον*, an *entail*, and *μορφη*, *form* or *appearance*.

ENTEROMORPHA *percursa*; frond capillary, entangled and variously twisted, simple or having a few short spine-like ramuli, compressed, solid (?), reticulated; cells quadrate, two or more (generally two) in the breadth of the frond, the endochrome nearly filling the cell.

ENTEROMORPHA *percursa*, *Hook. Br. Fl.* vol. ii. p. 315. *Harv. Man.* ed. 1. p. 176. (*not ed. 2. p. 215, where the specific character applies to E. Ralfsii, Harv. Phyc. Br. t. CCLXXXII.*)

SOLENIA *percursa*, *Ag. Syst.* p. 187.

SCYTOSIPHON *compressus*,  $\gamma$  *confervoideus*, *Lyngb. Hyd. Dan.* p. 65. t. 15. f. B. 4–6.

HAB. Muddy sea-shores, at half-tide level. Annual. Spring and summer. Appin, *Capt. Carmichael*. Larne, *Mr. D. Moore*. Clontarf, *Miss Ball* (!). Tor Abbey, *Mrs. Griffiths* (mixed with *Lyngbya Carmichaelii*, &c.)

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Fronds* decumbent, several inches in length, forming widely spreading, entangled strata; each separate frond variously curled and twisted, and ordinarily of the diameter of human hair. Such fronds are usually quite simple, and formed of a double row of quadrate cells, filled with endochrome, with hyaline borders to each cell; thus the filament appears to be traversed by a colourless central line. Mixed with these characteristic threads are others of twice or four times the diameter, formed of a larger number of rows of cells; and these filaments, which have much the aspect of young plants of *E. compressa*, are frequently furnished with short, or long, simple branches, formed, like the ordinary threads, of a double row of cells. I have not been able (in dried specimens) to find any cavity traversing the filament, as is usual in the genus. The cells composing the filaments are nearly filled with green matter, leaving narrow borders. The colour is a brilliant grass-green, which is generally well preserved in drying; and the substance is membranaceous, and rather soft.

At Plate CCLXXXII. I have already given, under the name *E. Ralfsii*, a representation of an *Enteromorpha* communicated

to me by Mr. Ralfs as *E. percursa*, but which our friend Mr. Thwaites decided to belong to a different species. In the present figure I hope I have given the true plant, but not having had the advantage of examining any authentically-named specimens, I am obliged to trust to the general accordance of the specimens here figured with the description given by Carmichael. My figure is drawn from a specimen collected by Miss Ball some years ago at Clontarf, and now in Herb. T. C. D., and it sufficiently accords with such specimens as I have examined from other parts of the coast. If the threads were all of one diameter, and all built of a double row of cells, there could be no difficulty in ascertaining the identity of the species; but unfortunately this is far from being the case in any specimen I have seen. The character by which *E. Ralfsii* differs is, the large size of the cells and the minuteness of the grain of endochrome in each. This, in the specimens seen, is very obvious. How far it may be of specific importance I cannot say.

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Fig. 1. ENTEROMORPHA PERCURSA:—*the natural size.* 2. Portions of filaments of various sizes:—*highly magnified.*

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## PLATE CCCLIII.

CLADOPHORA FLEXUOSA, *Griff.*

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch*, and φέρω, to *bear*.

CLADOPHORA *flexuosa*; filaments capillary, flexuous or angularly bent, pale green, much branched, the branches of unequal length and (comparatively) but little divided, set with curved secondary or tertiary branches, which are pectinated with secund, short, simple, spreading ramuli; articulations of the branches thrice or four times, of the ramuli twice as long as broad.

CLADOPHORA *flexuosa*, *Griff.*! in *Wyatt, Alg. Danm.* no. 227. *Harv. Man.* ed. 2. p. 202 (in part; the synonyms of Dillwyn and Eng. Bot., there quoted, being doubtful.)

CLADOPHORA *sirocladia*, β *gracilis*, *Kütz. Sp. Alg.* p. 392.

HAB. In rock-pools, between tide-marks, attached to other Algæ. Torquay, *Mrs. Griffiths*. (Other recorded stations require re-examination and verification.)

GEOGR. DISTR. (Doubtful.)

DESCR. *Filaments* capillary, three to six inches long, tufted, much branched, but not so densely bushy as several allied species, the principal branches angularly bent, and the secondary and tertiary branches, which are long and of unequal lengths, bent from side to side in an undulating manner. From the projecting angles of the bent branches, at either side, spring other lesser laterals, which are usually simple, and either naked, or more commonly pectinated along one side with several short ramuli, each of four or five articulations. These ramuli on some specimens are found lengthening out into branches, and again bearing ramuli. All the divisions are curved. The articulations in the stem are from three to four times as long as broad, not contracted at the joints; those of the ramuli are gradually shorter, and very little contracted, expanding nearly to their full shape when moistened after having been dried. The colour is a pleasant green, tolerably retained in drying. The substance is membranaceous, and the plant adheres to paper.

Not being in possession of any authentic specimen of the *Conferva flexuosa* of Dillwyn, on which the present species is supposed to be founded; and, also, having good reason to doubt

the identity of the plant here figured with that figured by Dillwyn, I think it best to abstain quoting any synonym or habitat which I have not recently verified. My figure and description therefore have reference alone to the specimens published by Mrs. Griffiths in Wyatt's 'Algæ Danmonienses,' and to such as agree with them in character. I am not very sanguine of the validity of this species, and, notwithstanding some differences in minor characters, would place it near *C. glaucescens*, to which it is closely related. The general aspect is not unlike that species, and the articulations are of about the same length; but here the stem and branches are more flexuous, the ramuli shorter in proportion, and the dissepiments are less contracted. I am not disposed to place much reliance on any of these characters.

Meanwhile, as the plant has been published in a work of such celebrity as the 'Algæ Danmonienses,' it is right that it should have a place in our volumes.

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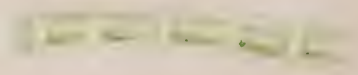
Fig. 1. CLADOPHORA FLEXUOSA :—*the natural size*. 2. Portion of a filament :—*magnified*. 3. Small portion of the same :—*more highly magnified*.

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B





## PLATE CCCLIV. A.

CONFERVA ARENICOLA, *Berk.*

GEN. CHAR. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, and having, at some period, a proper ciliary motion. CONFERVA (*Plin.*),—from *conferruminare*, to *consolidate*; because some of the species were used by the ancients for binding up fractured limbs.

CONFERVA *arenicola*; “threads soft, simple, extremely fine, matted, somewhat crisped, at first uniform pale green, at length distinctly jointed; articulations once and half as long as broad, dotted; interstices pellucid.”—*Berk.*

CONFERVA *arenicola*, *Berk. Gl. Br. Alg.* p. 36. t. 13. f. 3. *Harv. Man.* ed. 1. p. 128. ed. 2. p. 207.

HAB. Salt marshes, within reach of the tide, *Rev. M. J. Berkeley.*

DESCR. “Creeping on the sandy margins of pools in a salt marsh periodically flooded, forming a thin, soft, delicate, crisped web of a pale yellow-green. *Threads* extremely slender, flexuous, at first self-coloured with a few scattered dots, then with manifest dissepiments, and finally the granules contract and form a distinctly defined mass of a darker green in the centre, with pellucid interstices. Articulations  $1\frac{1}{2}$  as long as broad. When dry the articulations are alternately contracted.”—*Berk. l. c.*

I am indebted to Mr. Berkeley, from whose ‘Gleanings’ I copy the above account, for a loan of the original specimen from which his description was prepared. This I have used in preparing the magnified portion of the figure. Except in colour, this plant bears a close resemblance to *C. implexa*. I am not aware that it has been noticed more than once.

A. Fig. 1. Web of CONFERVA ARENICOLA, as presented to the naked eye.  
2. Filaments from the same:—*highly magnified.*

PLATE CCCLIV. B.

RHIZOCLONIUM CASPARYI, n. sp.

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(For GEN. CHAR. see Plate CCXXXVIII.)

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RHIZOCLONIUM *Casparyi*; filaments elongated, extremely slender, decumbent, pale yellow-green, stratified, interwoven, curved and here and there angularly bent; at the angles emitting short root-like branches, which sometimes lengthen, and are filled with endochrome; articulations 2–6 times longer than broad, with narrow dissepiments and granular endochrome.

HAB. At Falmouth and Penzance, *Dr. Robt. Caspary*.

DESCR. Forming a thin web of a bright green colour and considerable extent. *Filaments* elongate, more slender than those of *R. riparium*, gracefully curved rather than twisted, interwoven, here and there angularly bent. At the angle issues a root-like process, which sometimes consists but of a few empty cells; at other times lengthens out into a branch. *Cells* in the same fleece very various, and even in the same filament at different ages: the full-grown cell seems to be fully six times as long as its diameter; but short cells once and a half to twice as long as broad, which seem to be cells in process of development are commonly mixed with the long cells. All contain a granular endochrome, the grains of very unequal size.

---

Having a half plate to spare, I take the opportunity of figuring a *Rhizoclonium*, sent to me some months ago by Dr. Caspary, and found by him near Penzance and Falmouth. It has more slender filaments than the ordinary *R. riparium*, and occasionally appears with longer joints. But the joints vary extremely in different threads, and even in the same thread, so that I find it difficult to fix any satisfactory character by which it can be known from *R. riparium*, in the absence of ascertained specimens of that plant. The root-like branches are sometimes much more developed than is shown in the figure, which was made from less mature specimens than I afterwards received.

---

B. Fig. 1. Web of RHIZOCLONIUM CASPARYI, as it appears to the naked eye. 2. Filaments from the same:—*magnified*. 3, 4. Portions of different filaments, in one of which the cells have divided, in the other attained their full size.

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1.



H.

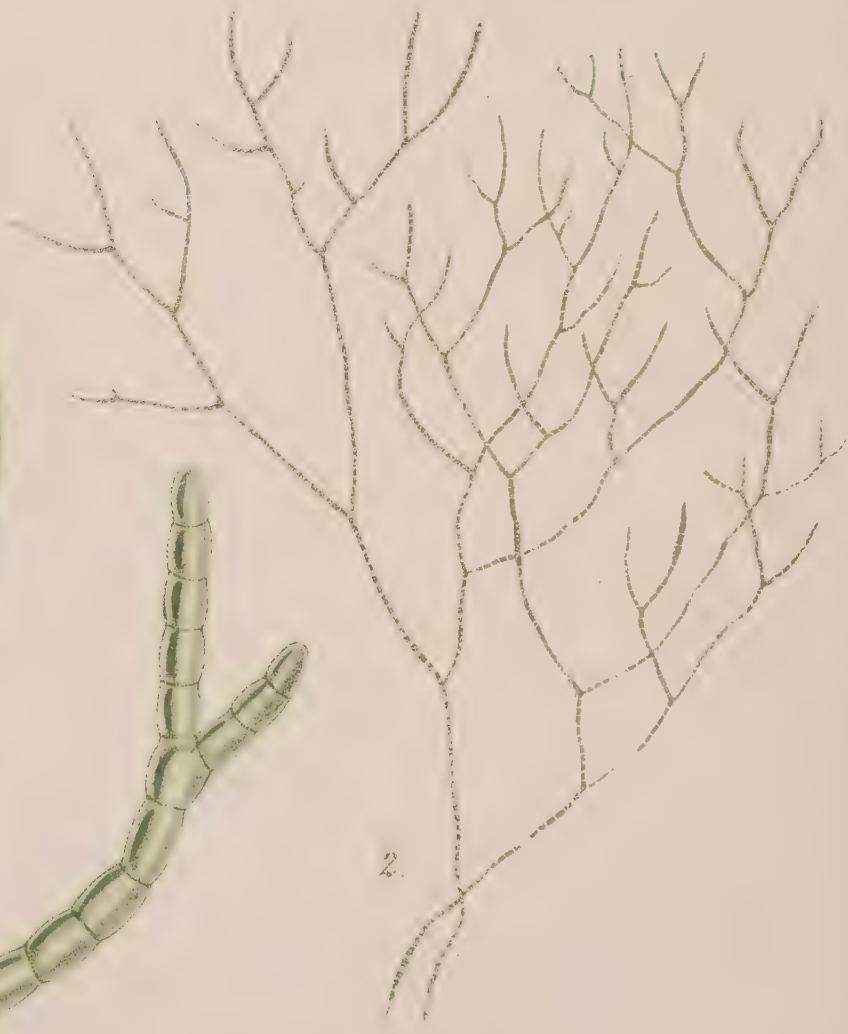
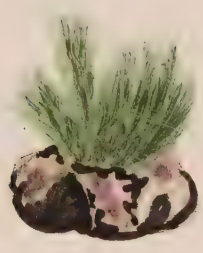




PLATE CCCLV. *A*.

## CLADOPHORA MAGDALENÆ, n. sp.

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch*, and φέρω, to *bear*.

CLADOPHORA *Magdaleneæ*; filaments capillary, blackish-green, short, decumbent (?), matted together, slightly branched, irregularly bent; branches patent or divaricate, curved, dichotomous or secund, with wide axils; ramuli few, spreading, falcate, as thick as the cells from which they spring; articulations thrice or four times as long as broad, filled with very dense opaque endochrome; dissepiments very narrow, not contracted.

HAB. At Jersey, *Miss Magdalene Turner*.

DESCR. *Filaments*, in the only specimen examined, about an inch long, matted together, but not tufted, apparently growing either prostrate or entangled among the bases of other Algæ, not much branched. *Branches* irregularly dichotomous, or angularly alternate, spreading with wide angles, often divaricate, curved, simple or once or twice divided; naked, or furnished with a few secund, falcate ramuli. *Articulations* thrice or four times as long as broad, those of the ramuli the shortest, filled with a very dense, dark green, minutely granulated endochrome (resembling that of *C. rupestris*); the dissepiments very narrow and scarcely at all contracted. The apices obtuse. *Substance* somewhat rigid, not adhering to paper in drying. *Colour* a dark, dingy-green.

Not knowing to what described species to refer the apparently distinct little plant here figured, I give it a provisional name. Unlike as it is in ramification and general aspect to *C. rupestris*, the cells under the microscope strongly resemble those of that species; yet I can hardly think it next of kin to that straight-growing plant, and perhaps *C. fracta* is more nearly related.

Had it been more certainly characterized or more pleasing to the eye, I should have felt a greater pleasure in naming it from its discoverer, to whom this work is indebted for many interesting additions, and for a large proportion of whatever information it affords on the Algæ of Jersey.

*A*. Fig. 1. CLADOPHORA EXILIS :—the natural size. 2. Portion of filaments :—magnified.

CLADOPHORA GATTYÆ, n. sp.

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CLADOPHORA *Gattyæ*; filaments an inch long, dingy-green, capillary, matted together in dense tufts, not much branched, dichotomously divided, flexuous, with few ramuli; articulations in all parts of the frond nearly uniform, about once and half as long as broad, filled with endochrome; the dissepiments very narrow, contracted.

HAB. On rocks (?) near low-water mark. Locality uncertain, *Mrs. Gatty*.

DESCR. *Filaments* about an inch long, as thick as human hair, or somewhat thicker, matted together in dense ropy tufts, irregularly branched, somewhat dichotomous, the angles rounded; ramuli few and patent. *Articulations* very uniform, about once and half as long as broad; filled with olivaceous (?) or dull green endochrome, and separated by exceedingly narrow dissepiments. *Apices* on my specimen often broken. *Substance* membranaceous, adhering to paper.

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A puzzle, figured with the hope that it may lead to more certain information. The external habit is between that of *C. uncialis* and *Ectocarpus littoralis*, but the threads are very much more robust than in the former; and differently branched from the latter, as well as more robust. The plant is, however, much battered and water-worn, having most of its upper branches and ramuli broken off:—and I am not prepared to say whether it be not some species in a dilapidated condition, whose proper character is thus concealed, or as it were shown in caricature.

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B. Fig. 1. CLADOPHORA INAMÆNA:—*the natural size*. 2. Filaments:—*magnified*. 3. Small portion of the same:—*more highly magnified*.

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## PLATE CCCLVI.

CLADOPHORA BALLIANA, *Harv.*, n. sp.

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch*, and φέρω, to *bear*.

CLADOPHORA *Balliana*; filaments elongate, extremely slender, soft, grass-green, much branched; the branches excessively divided, the penultimate ones virgate, and set with slender, secund, one- or two-jointed ramuli; articulations of the branches eight or ten times as long as broad, of the ramuli six to eight times, all filled with dense, granular endochrome; dissepiments broad and hyaline.

HAB. Sea-shores. At Clontarf, *Miss Ball* (May 16, 1843).

GEOGR. DISTR. — ?

DESCR. *Filaments* finer than human hair, from six to eight or ten inches long, tufted and much branched, the branching repeatedly alternate, but irregular and difficult to trace; with a more or less evident leading stem. Lesser branches one or two inches long, somewhat virgate, undivided, set with other minor branches, which again bear numerous short, pectinate ramuli, generally along their inner faces. These ramuli are much more slender than the joint from which they spring, and usually consist of but two cells, but occasionally lengthen out into several. The branches and lesser divisions taper, at the extremity, into a slender point. The endochrome filling the cells is remarkably dense, granular, and in great measure recovers its form on remoistening after the plant has been dried; and is of a full grass-green. The length of the cells in the principal divisions is from eight to ten times their diameter, or perhaps more; in the ramuli the cells are shorter. The border of the tube and the dissepiments are both very wide in proportion to the part occupied by endochrome. The substance is soft and tender, and the plant closely adheres to paper in drying.

I am glad, in closing the 'Phycologia,' to have an opportunity of paying a grateful tribute to the fair discoverer of the present beautiful species, from whom I have, during the course of this publication, received much assistance—in supplies of specimens, &c.—and to whose acute eye the Irish Flora is indebted for the addition of many interesting species. *Cladophora Balliana*, not the least beautiful of these, is readily known from all its British

congeners but one, by the tenuity and lubricity of the filament, in conjunction with the great length of the cells. The only species with which it can be confounded is *C. Rudolphiana*, but the ramification is so different in that plant, that, notwithstanding a near agreement in the length of the articulations and the general aspect of the tufts, there can be little difficulty in distinguishing one from the other.

As yet I have only seen the specimens collected by Miss Ball, so long ago as 1843. As I have been in no haste to publish it as a novelty, I hope it may stand permanently as a good species.

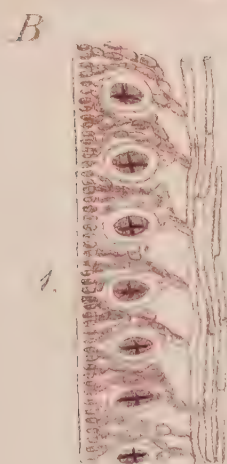
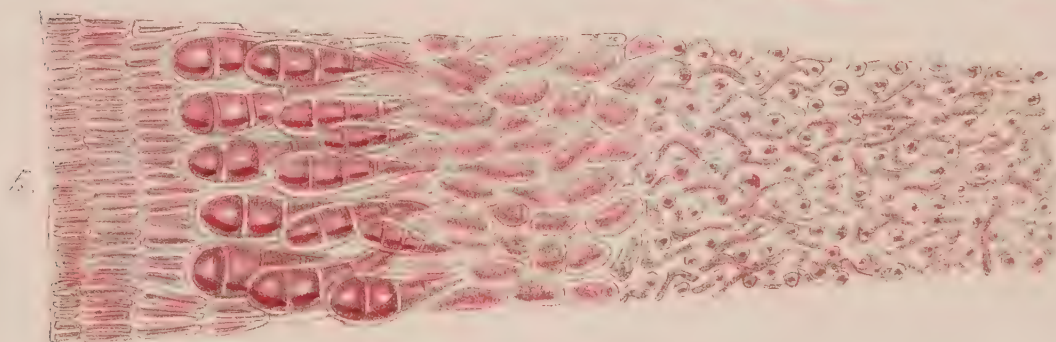
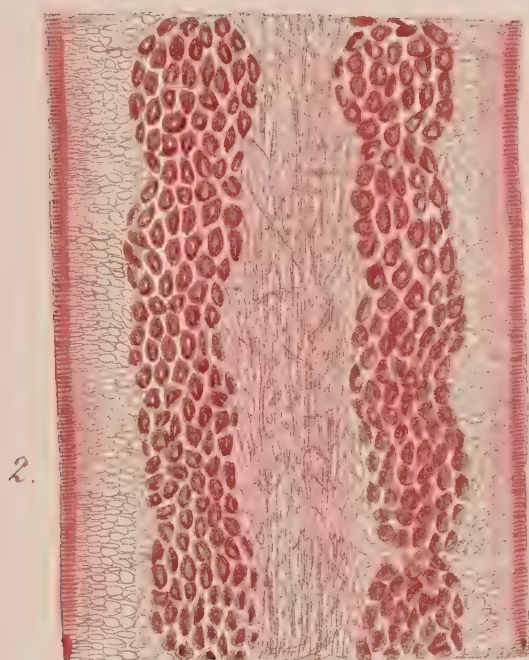
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Fig. 1. CLADOPHORA BALLIANA :—*the natural size*. 2. Portion of a filament :—*magnified*. 3. Branchlet, and 4, part of the same :—*less and more highly magnified*.

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## PLATE CCCLVII. A.

FURCELLARIA FASTIGIATA, *Lamour.*

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(For description, &c., see PLATE XCIV.)

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My remarks appended to Pl. XCIV. had scarcely been made public when I received from Mrs. Griffiths specimens of *F. fastigiata* in both kinds of fruit, which I regret had not reached my hands in time to withhold both that plate, of which the analytic figures 3 and 4 are incorrect, and the remarks appended to it, so far as they refer to the fructification.

Dr. Caspary has given, in the Annals of Natural History (Second Series, vol. vi. p. 87), a minute account of the comparative structure of *Furcellaria* and *Polyides*, with micrometric measurements of the cells composing the various strata of their fronds; but it is due to Mrs. Griffiths to state that she has long been perfectly well acquainted with the fructification of *Furcellaria*, figures of which I now give in detail.

Fig. 1 represents a cross section of one of the pod-like branches, of which fig. 2 is a longitudinal cutting. Fig. 1 shows five *favellæ* formed from the large cells immediately in contact with the fibro-cellular axis. In fig. 2, two of these favellæ are shown, prolonged by several superimposed favellæ having become confluent, as is almost always the case in fully ripe specimens. Fig. 3 is a small transverse slice, to show the cells more highly magnified; fig. 4 represents some spores separated. Fig. 5 is a transverse segment of a frond producing *tetraspores*, which are formed in several rows (according to age) from the cells of the middle stratum most distant from the axis. These *tetraspores* (fig. 6) are pear-shaped and transversely zoned.

I am indebted to Mrs. Griffiths for numerous and beautiful specimens of both kinds of fruit in the most perfect state.

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DUMONTIA FILIFORMIS, *Grev.*

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(See description under PLATE LIX.)

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The analysis in Pl. LIX. fig. 2 and 3, and the generic character, are both faulty. It is hoped that the figures now given will show the proper structure of the walls of the frond, and the position of the fructification; and the following emended generic character is offered:—

GEN. CHAR. *Frond* tubular; the tube at first occupied by a lax network of longitudinal, anastomosing filaments; at length distended and empty. Walls composed of longitudinal, anastomosing filaments, emitting toward the circumference dichotomous, moniliform branches, which form a middle stratum; cortical stratum composed of a single layer of small cells. *Favellæ* roundish, formed by a metamorphosis of the dichotomous branches. *Tetraspores* dispersed, cruciate, with wide limbs, sunk beneath the cortical stratum, formed of one of the cells of the dichotomous branchlet.

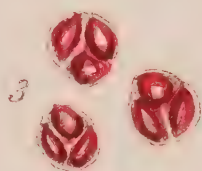
From this it will be seen that *Dumontia* has nearly the same structure as *Catenella*, omitting the constricted branches. The statement made under Pl. LIX. that I had seen no tetraspores of this common plant, has brought me specimens from several kind correspondents, to whom my thanks are due. At the same time (to my shame be it spoken) I find, on examining some old specimens collected in 1832, that I ought to have made no such statement, and further, that the *tetraspores* of this Alga are very common. It sometimes happens that botanists are less acquainted with the structure of very common than of rarer plants, and in this instance I have to plead guilty to a careless want of observation.

- 
- B.* Fig. 1. Vertical slice of the wall of DUMONTIA FILIFORMIS, with *tetraspores*.  
2. Small portion of the same. 3. Vertical slice of a specimen with *favellæ*.  
4. Small portion of the same:—all the figures *more or less highly magnified*.
-





A.



B.

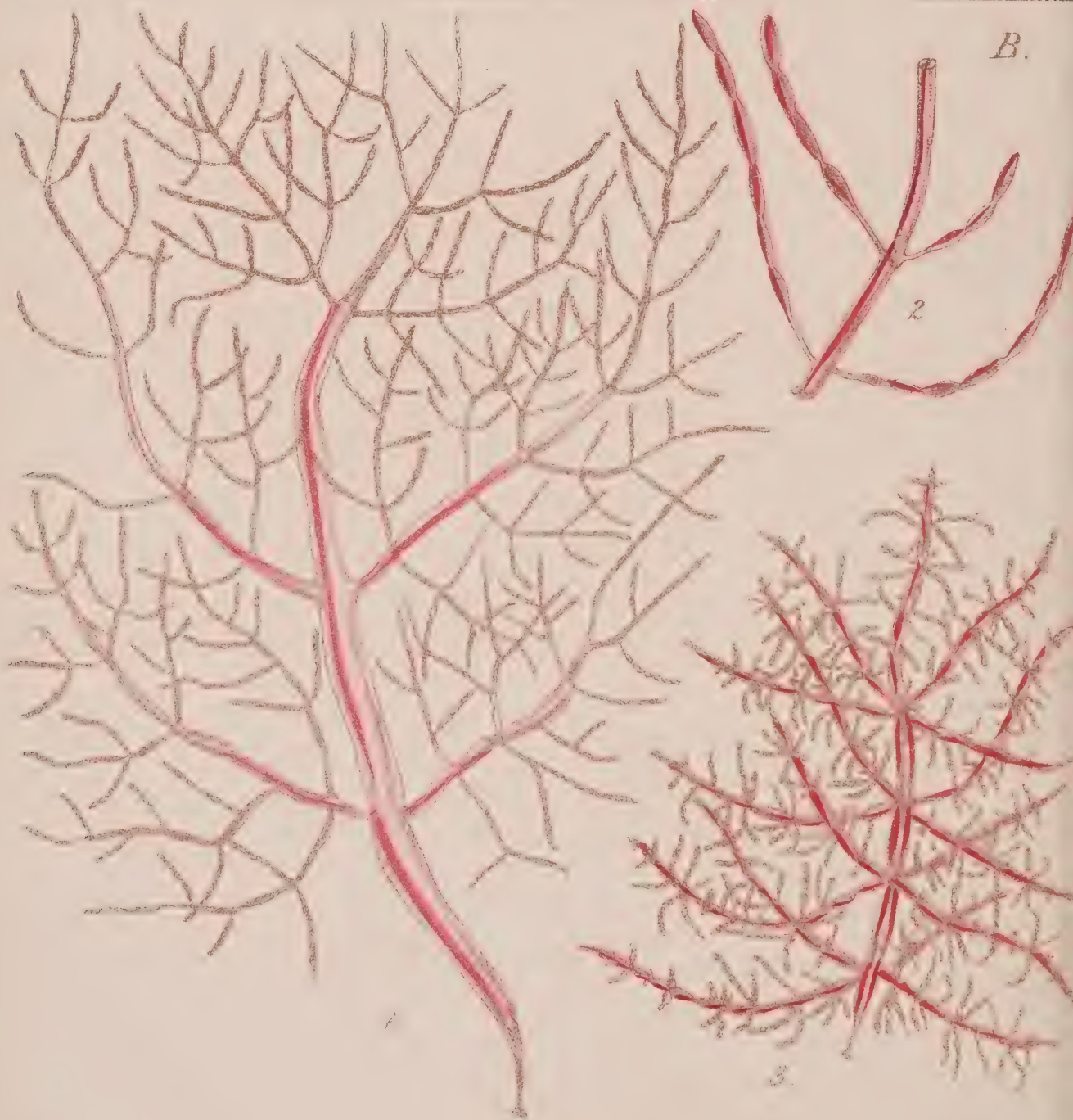




PLATE CCCLVIII. *A*.CHRYSYMENIA ROSEA, *Harv.*

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(For description see PLATE CCCI.)

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I have nothing to add to the account already given of this plant under the above-quoted figure, but merely redeem my pledge by figuring one of Mrs. Gatty's Filey specimens, to contrast with the figure of the Orkney plant already given. The Filey specimen is taller, narrower in proportion, with better developed pinnæ, and is in fruit. Though narrow, in comparison to the Orkney variety, it is greatly broader than any form of *C. clavellosa* with which I am acquainted; but I have been assured by Dr. Walker Arnott that a drawing exists in the late Mr. Brodie's Herbarium, which Dr. Arnott considers identical with my *C. rosea*. I possess specimens of *C. clavellosa*, var. *sedifolia*, of Mr. Brodie's gathering, but they are very unlike the plant here figured.

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*A*. Fig. 1. CHRYSYMENIA ROSEA :—*the natural size*. 2. A ramulus with *tetraspores* :—*magnified*. 3. Tetraspores :—*highly magnified*.

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PLATE CCCLVIII. B.

CHYLOCLADIA KALIFORMIS, vars.  $\beta$  &  $\gamma$ .

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(For description, &c., see PLATE CXLV.)

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Under Pl. CXLV. I have characterized what I consider to be two varieties of *C. kaliformis*, but which continental correspondents have sent me as distinct species. The former, our var.  $\beta$ , *patens*, being the *Ch. patens*, Kütz., and the latter,  $\gamma$ , *squarrosa*, the *Ch. squarrosa* of the same author. As there was not room to represent these forms on Pl. CXLV., I avail myself of the present opportunity to figure them. The specimens here drawn are Irish, fig. 1 being from Carrickfergus, and fig. 3 from Roundstone; both collected by the late Mr. M'Calla.

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B. Fig. 1. CHYLOCLADIA KALIFORMIS,  $\beta$  *patens*:—*the natural size*. 2. Ramuli:—*magnified*. 3. Ch. kaliformis,  $\gamma$  *squarrosa*:—*the natural size*.

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## PLATE CCCLIX.

ZONARIA COLLARIS, *Ag.*

GEN. CHAR. *Root* coated with woolly fibres. *Fron*d flat, ribless, fan-shaped, entire or variously cleft, marked with concentric lines; the cells of the surface radiating. *Margin* fringed. *Fructification*, roundish or irregular, scattered *sori*, bursting through the cuticle of both surfaces of the frond, consisting, at maturity, of numerous *spores* nestling among jointed threads. ZONARIA (*Ag.*),—from ζώνη, a *girdle* or *zone*.

ZONARIA *collaris*; “frond procumbent, coriaceous, orbicular, or cuneate and variously lobed, from its upper surface emitting cup-shaped, membranaceous fronds; the under surface rooting, densely stupose.” *J. Ag.*

ZONARIA *collaris*, *Ag. Sp. Alg.* vol. i. p. 127. *Ag. Syst.* p. 264. *J. Ag. Alg. Medit.* p. 38. *Endl. 3rd Suppl.* p. 25. *Kütz. Sp. Alg.* 565.

PADINA *collaris*, *Grev. Syn.* part xlv. *Menegh. Ital.* p. 245. *Mont. Alger.* p. 33.

PADINA *omphalodes*, *Mont. Crypt. Alger.* p. 15. No. 168.

ZANARDINIA *prototypus*, *Nardo.* (fide *Meneg., &c.*)

HAB. (Washed ashore.) Granville Bay, Jersey (May 1851). *Miss Turner.* (Very rare.)

GEOGR. DISTR. Mediterranean and Adriatic Seas. West Indian Sea.

DESCR. “The primary frond, when mature, is coriaceous in colour and substance, widely spreading, furnished with a dense woolly coating on its lower surface, by which it strongly adheres to rocks; the upper surface is smooth, and variously plaited longitudinally; but by the action of the waves and of animalcules is mostly very much torn and lobed. From the upper surface of this primary frond rise cup-shaped secondary fronds, fixed by a very short stipes, in the dried plant resembling an umbilicus, and with the limb fringed with filaments. The youngest of these secondary fronds are smaller than peas; the full-grown about the height of the cup-shaped fronds of *Himanthalia*; all are delicately membranaceous, entire, and easily torn. The fringe of hairs that crowns the frond is formed of the free apices of the longitudinal strings of cells of the frond. Fruit unknown.” *J. Ag.*

This most interesting addition to the Channel *Nereis*, was recently found on the shores of Jersey, by Miss Turner, to whom I am indebted for the specimens here figured, and which I rejoice to be able to include in the present work. They were “quite fresh,” Miss Turner informs me, “when picked up;

lying among other Algæ on the sand in Granville Bay ; they had a saucer-like shape, which they have lost in pressing.” They consist merely of the secondary fronds, accidentally torn from the firmly attached primaries, which may possibly be reached by dredging on the coast. I have compared them with specimens of the Mediterranean plant received from J. Agardh, and the agreement is very perfect. There can, therefore, be no doubt of the identity of the species.

Never having seen the primary frond, I give the specific character and description nearly in the words of Agardh ; and our upper figure (fig. 1) is an attempted restoration of the flattened specimen, more faithfully represented at fig. 2.

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Fig. 1. ZONARIA COLLARIS :—*the natural size*. 2. One of the fronds of the same opened out :—*the natural size*. 3. Apex of frond, with its fringe. 4. Filaments from the fringe :—*both magnified*.

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## PLATE CCCLX.

CYSTOSEIRA BARBATA, *Ag.*

GEN. CHAR. *Fronde* much branched, occasionally leafy at the base; *branches* becoming more slender upwards, and containing strings of simple air-vessels within their substance. *Receptacles* terminal, small, cellular, pierced by numerous pores, which communicate with immersed, spherical *conceptacles*, containing parietal *spores*, and tufted *antheridia*. CYSTOSEIRA (*Ag.*),—from *κυστις*, a *bladder*, and *σειρα*, a *chain*; because the air-vessels are often arranged in strings.

CYSTOSEIRA *barbata*; stem cylindrical, covered with small, elliptical knobs, each of which bears a very slender, many times dichotomo-pinnated, filiform branch; air-vessels lanceolate, one or two together; receptacles small, elliptic-oblong, mucronate.

CYSTOSEIRA *barbata*, *Ag. Sp. Alg.* vol. i. p. 57; *Syst.* p. 283. *Grev. Alg. Brit.* p. 6. *Hook. Br. Fl.* vol. ii. p. 265. *Harv. Man.* ed. 1. p. 18; ed. 2. p. 17. *J. Ag. Sp. Alg.* vol. i. p. 223.

FUCUS *barbatus*, *Good. et Woodw. Linn. Trans.* vol. iii. p. 128. *Turn. Syn.* p. 80; *Hist.* t. 250. *Sm. E. Bot.* t. 2170. *Stack. Ner. Brit.* p. 83. t. 14.

FUCUS *foeniculaceus*, *Gm. Hist.* t. 2 A. f. 2 (!). *Huds. Fl. Ang.* p. 575.

HAB. Rocks between tide-marks. Said to have been gathered by Hudson in Devonshire; but has not been recently found.

GEOGR. DISTR. In the Mediterranean, Adriatic, and Black Seas. Brest, fide *Lenormand*.

DESCR. *Stem* about as thick as a swan's quill, simple or branched, truncate, densely clothed with lateral branches. *Branches* rising from slightly in-crassated bases, filiform, very slender, unarmed, decompound, repeatedly pinnate, the lesser divisions dichotomous. *Vesicles*, when present, numerous, elongate, ellipsoidal or lanceolate, two or more together forming a chain in the branch. *Receptacles* terminating the dichotomous ramuli linear, of small size, 1–2 lines long, or rarely 3–4 lines, tuberculated, unarmed, or rarely with one or two spine-like processes, mucronate; the mucro subulate. *Colour* brownish-olive, becoming very dark in drying.

The figure here given has been prepared chiefly from a specimen collected at Catania in Sicily, and given me, many years ago, by Professor Gussone. I have seen no British specimen, nor am I aware that any authentic evidence is on record of the finding of this plant on the British coast, although it is mentioned

as an undoubted native of Devonshire by Hudson, Stackhouse, and other early writers on these plants. Hudson says of it, "in *Devonia passim*," and Stackhouse gives "Devonshire and S.W. coast" as the station, but adds, "This species is rare, and has occasioned mistakes among our English botanists, who, after the example of Gmelin, have given it the trivial name of *F. fœniculaceus*, which appears, by the Linnæan herbarium, to be a very different species," &c. Both these authors quote Gmelin's figure, which, Turner observes, "is so characteristic" of his *F. barbatus* "as to take away all doubts as to the species." The last-named author, however, adds, "How far *F. barbatus* is really entitled to a place in the British Flora I own I entertain much doubt. I never saw a specimen gathered on our shores; and in Devonshire, where Hudson is stated to have gathered it, I have been fortunate enough to enjoy the advantage of correspondents, who would have been little likely to have left it unnoticed." This was written upwards of thirty years ago, since which time no part of England has been more zealously or more successfully explored (as these volumes bear ample evidence) than the coasts of Devonshire and Cornwall, but no one has met with a scrap of this plant; wherefore I fear it is but too evident that it has no claim to a place in this work.

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Fig. 1. *CYTOSEIRA BARBATA*; branch:—*the natural size*. 2. Dichotomous ramulus:—*magnified*. 3. A receptacle and air-vessel:—*rather more magnified*.

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